US 20040080779A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2004/0080779 A1

Kawamoto (43) Pub. Date: Apr. 29, 2004

(54) PRINT CONTROL METHOD AND APPARATUS

(75) Inventor: Hirokazu Kawamoto, Tokyo (JP)

Correspondence Address:
FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112 (US)

(73) Assignee: CANON KABUSHIKI KAISHA, TOKYO (JP)

(21) Appl. No.: 10/727,640

(22) Filed: Dec. 5, 2003

Related U.S. Application Data

(63) Continuation of application No. 09/268,701, filed on Mar. 16, 1999.

(30) Foreign Application Priority Data

Mar. 17, 1998 (JP) 10-066539
Mar. 8, 1999 (JP) 11-060090

Publication Classification

(51) Int. Cl.[7] G06F 3/12; G06F 13/10; G06F 11/30; G06F 15/00

(52) U.S. Cl. 358/1.14; 358/1.15; 719/321; 710/15

(57) ABSTRACT

A print processing environment in which an alternate printing process can be automatically performed by a printing apparatus of a next priority when a fault occurs during a printing process is freely established. A common driver for converting data that does not depend on a printing apparatus into print data to an arbitrary printing apparatus is provided, thereby releasing an application early. When an error occurs during the printing process for the selected printing apparatus, the printing apparatus of the next priority is automatically selected. A printer driver peculiar to the selected printing apparatus forms print control information that is optimum to the printing apparatus of the next priority in a short time from a drawing object as apparatus independent data which has already been converted by a common printer driver and stored in a spool file.

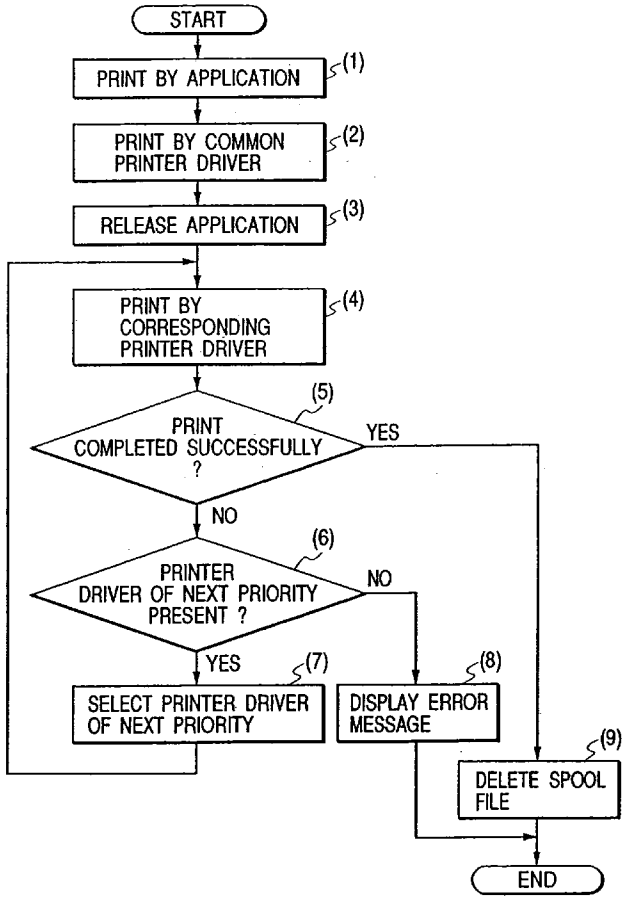


FIG. 1

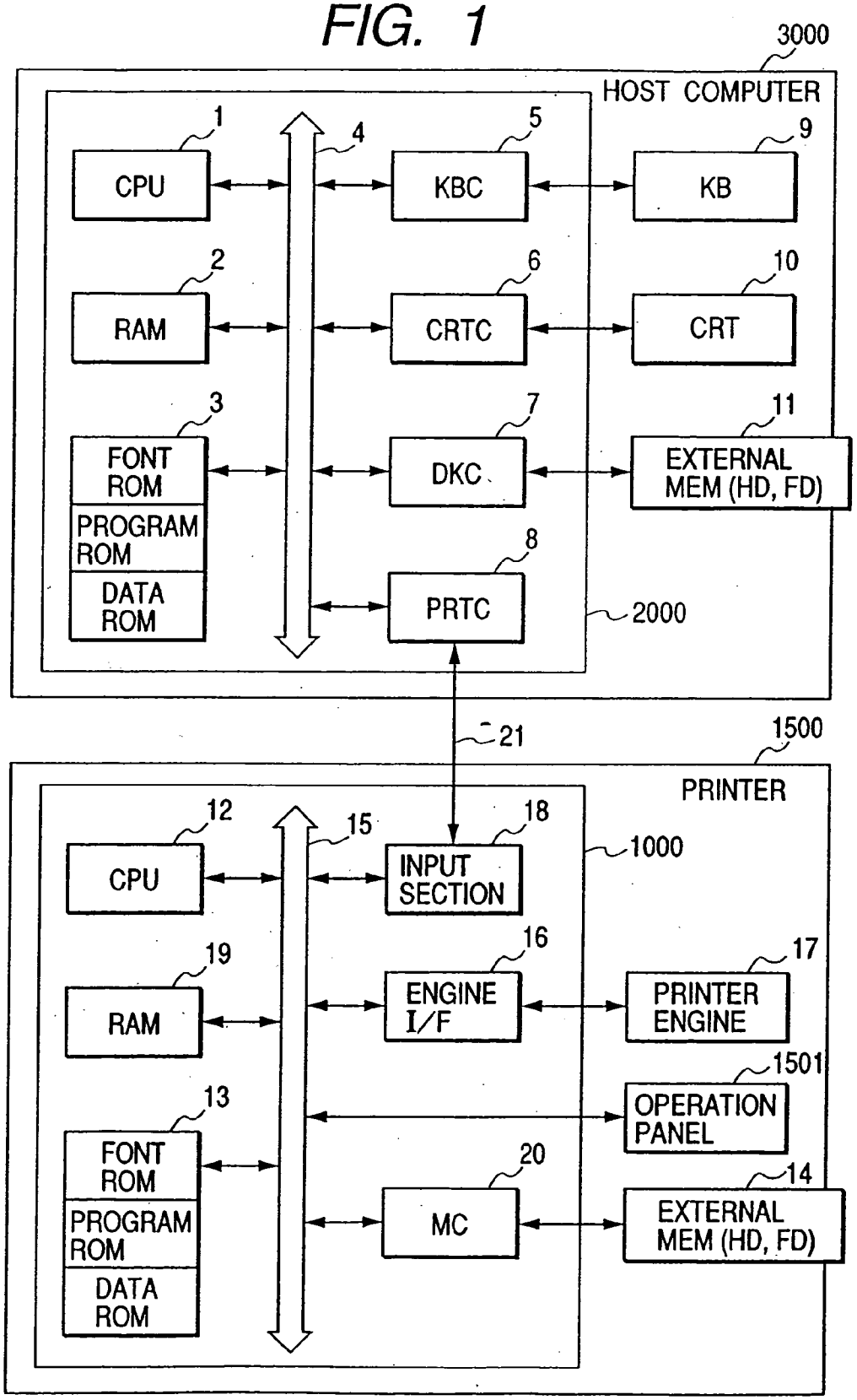

3000
HOST COMPUTER
1
CPU
4
5
KBC
9
KB
2
RAM
6
CRTC
10
CRT
3
FONT ROM
PROGRAM ROM
DATA ROM
7
DKC
11
EXTERNAL MEM (HD, FD)
8
PRTC
2000
21
1500
PRINTER
12
CPU
15
18
INPUT SECTION
1000
19
RAM
16
ENGINE I/F
17
PRINTER ENGINE
1501
OPERATION PANEL
13
FONT ROM
PROGRAM ROM
DATA ROM
20
MC
14
EXTERNAL MEM (HD, FD)

FIG. 2

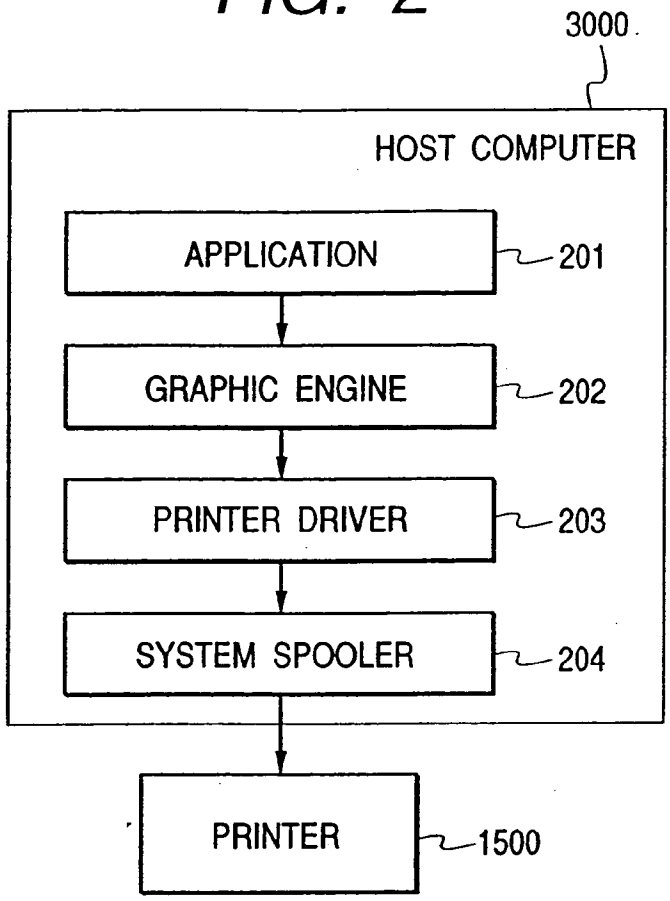

3000
HOST COMPUTER
APPLICATION
201
GRAPHIC ENGINE
202
PRINTER DRIVER
203
SYSTEM SPOOLER
204
PRINTER
1500

FIG. 4

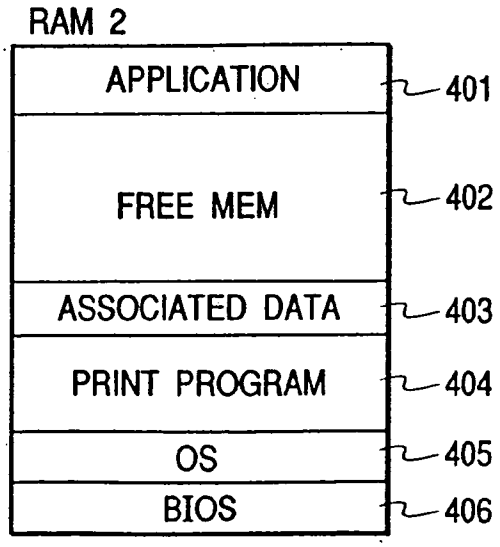

RAM 2
APPLICATION
401
FREE MEM
402
ASSOCIATED DATA
403
PRINT PROGRAM
404
OS
405
BIOS
406

FIG. 3

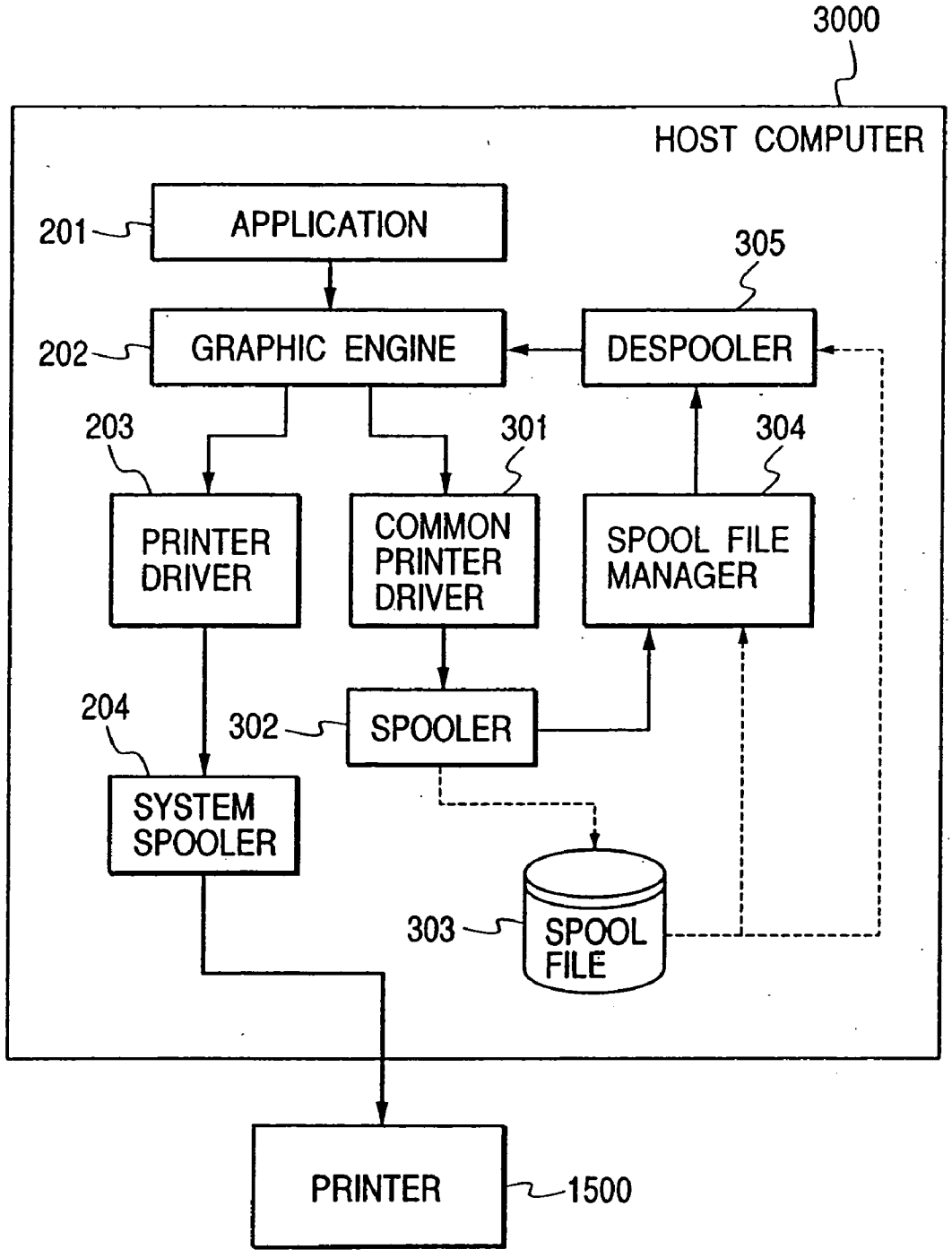

3000
HOST COMPUTER
201
APPLICATION
305
202
GRAPHIC ENGINE
DESPOOLER
203
301
304
PRINTER DRIVER
COMMON PRINTER DRIVER
SPOOL FILE MANAGER
204
302
SPOOLER
SYSTEM SPOOLER
303
SPOOL FILE
PRINTER
1500

FIG. 5

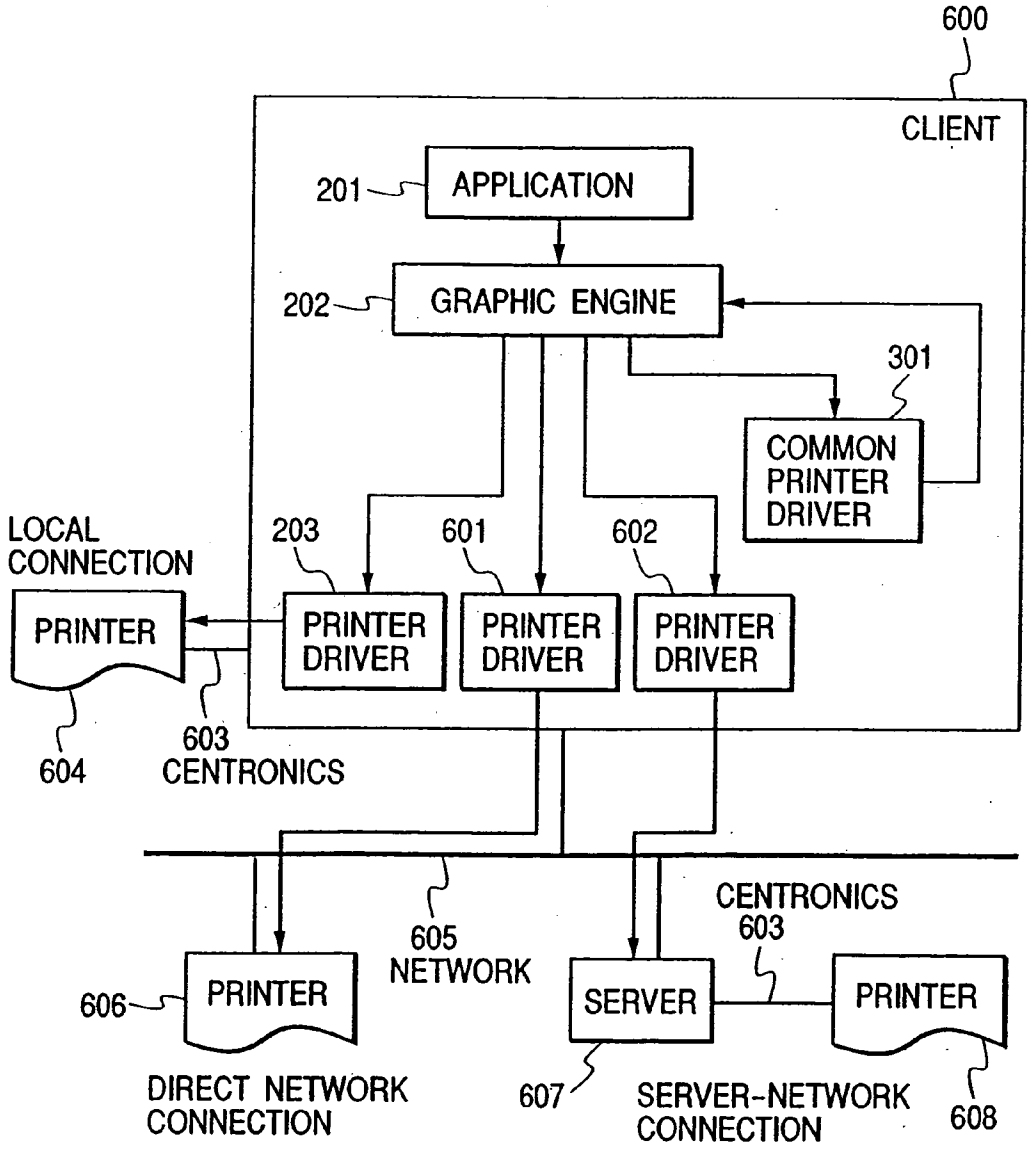

600
CLIENT
201
APPLICATION
202
GRAPHIC ENGINE
301
COMMON PRINTER DRIVER
LOCAL CONNECTION
203
601
602
PRINTER
PRINTER DRIVER
PRINTER DRIVER
PRINTER DRIVER
604
603 CENTRONICS
605 NETWORK
CENTRONICS 603
606
PRINTER
SERVER
PRINTER
DIRECT NETWORK CONNECTION
607
SERVER-NETWORK CONNECTION
608

FIG. 6

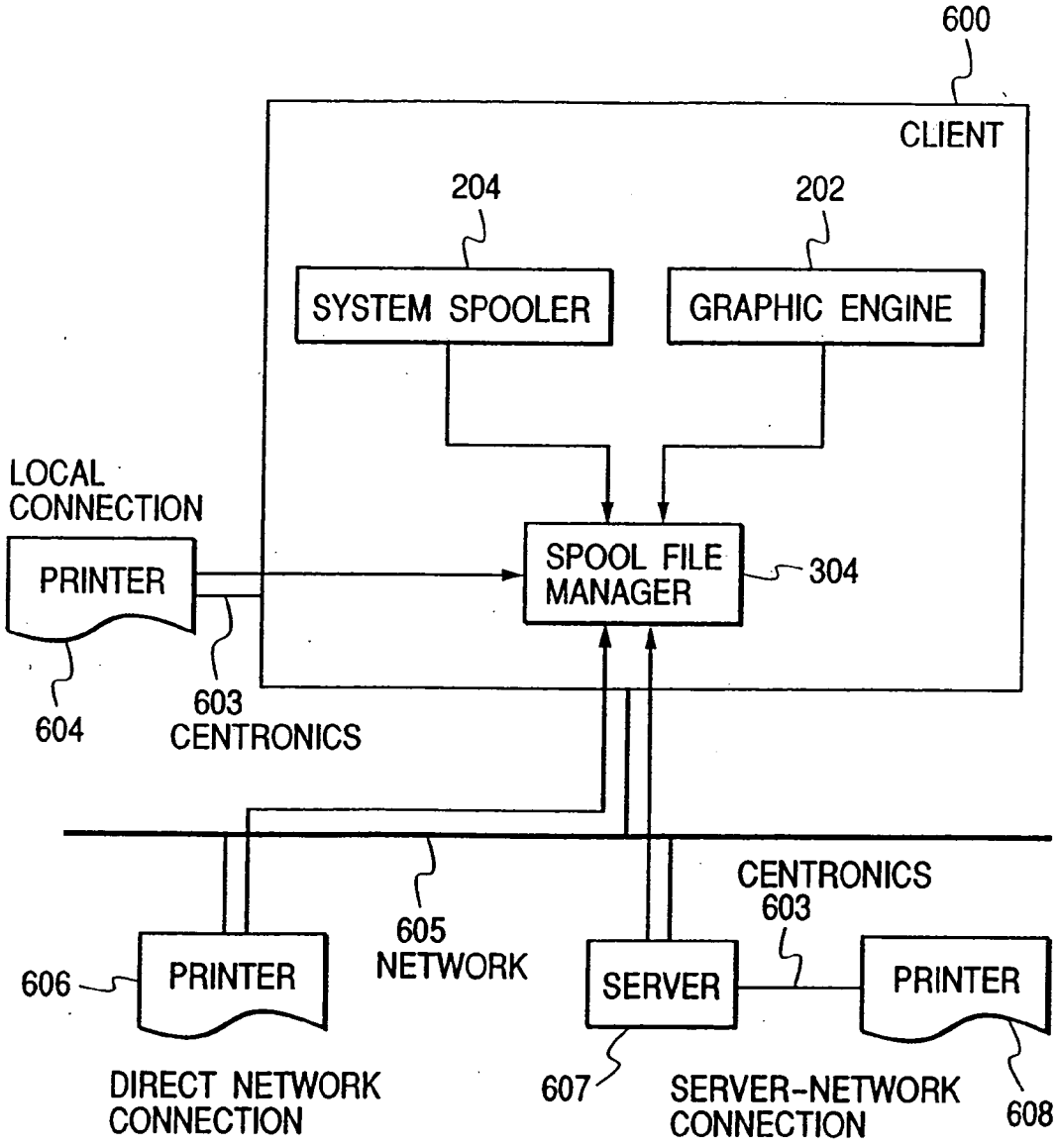

600
CLIENT
204
202
SYSTEM SPOOLER
GRAPHIC ENGINE
LOCAL CONNECTION
PRINTER
SPOOL FILE MANAGER
304
604
603 CENTRONICS
605 NETWORK
CENTRONICS 603
606
PRINTER
SERVER
PRINTER
DIRECT NETWORK CONNECTION
607
SERVER-NETWORK CONNECTION
608

FIG. 7

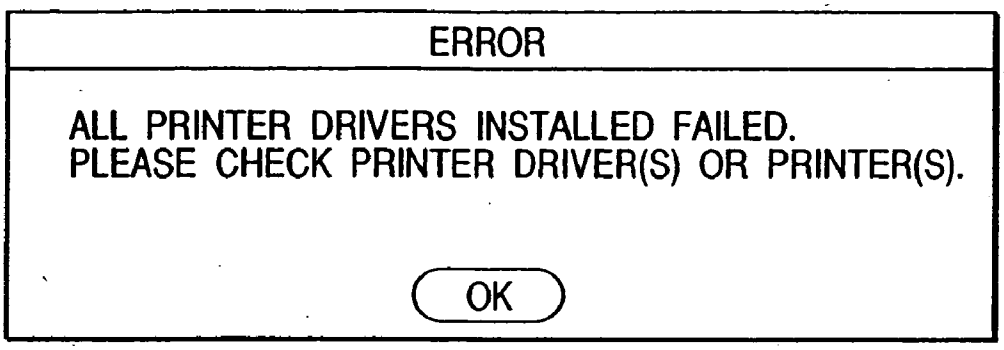


FIG. 8

PRINTER AS SELECTED	PRINTER OF NEXT PRIORITY
PRINTER 604	606 → 608
PRINTER 606	604 → 608
PRINTER 608	606 → 604

FIG. 9

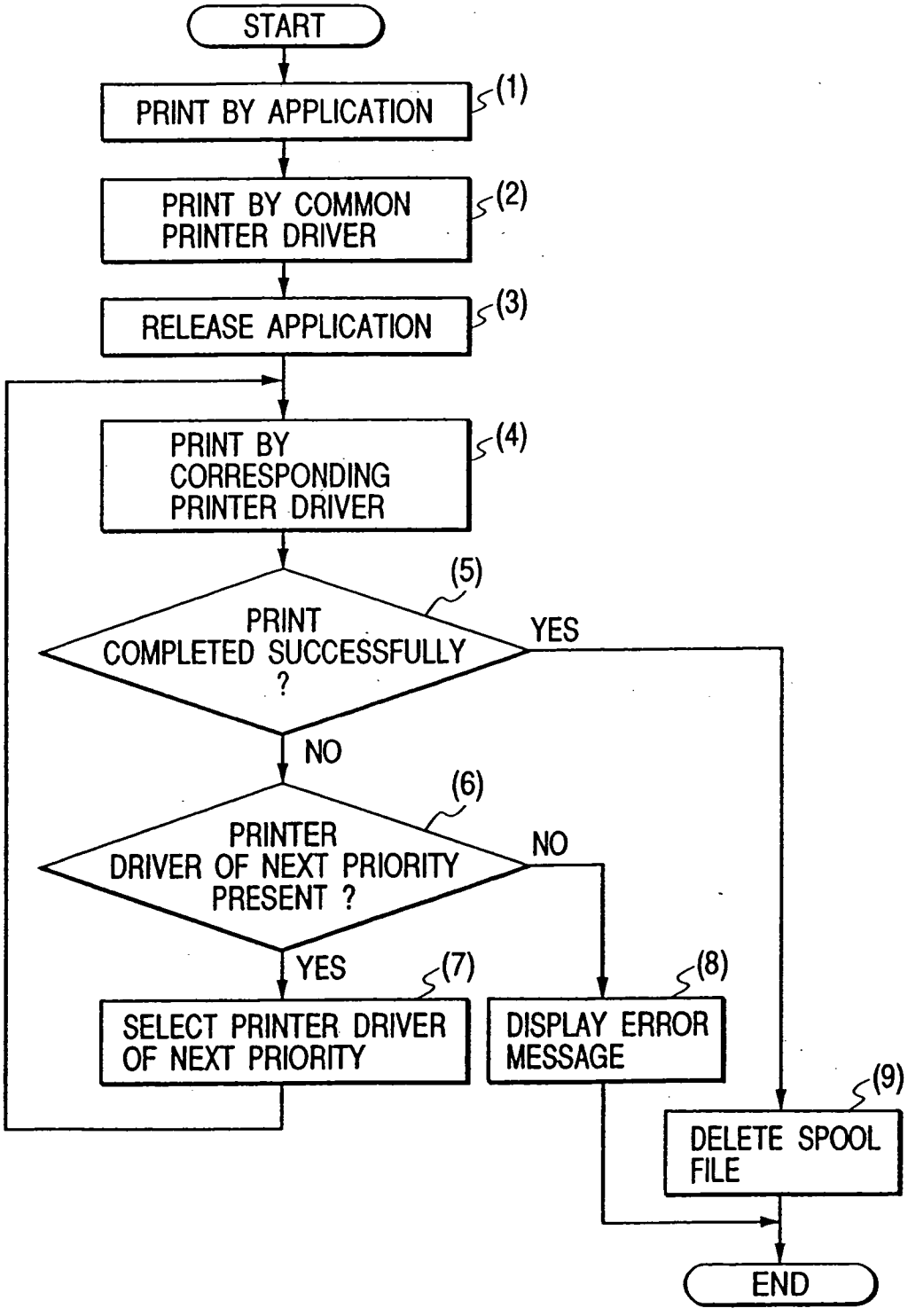

START
PRINT BY APPLICATION
(1)
PRINT BY COMMON PRINTER DRIVER
(2)
RELEASE APPLICATION
(3)
PRINT BY CORRESPONDING PRINTER DRIVER
(4)
PRINT COMPLETED SUCCESSFULLY ?
(5)
YES
NO
PRINTER DRIVER OF NEXT PRIORITY PRESENT ?
(6)
NO
YES
SELECT PRINTER DRIVER OF NEXT PRIORITY
(7)
DISPLAY ERROR MESSAGE
(8)
DELETE SPOOL FILE
(9)
END

FIG. 10

PRINTER AS SELECTED	PRINTER OF NEXT PRIORITY	
PRINTER 604	606 → 608	
	COMPATIBILITY	○ ×
PRINTER 606	604 → 608	
	COMPATIBILITY	○ ×
PRINTER 608	606 → 604	
	COMPATIBILITY	× ×

FIG. 11

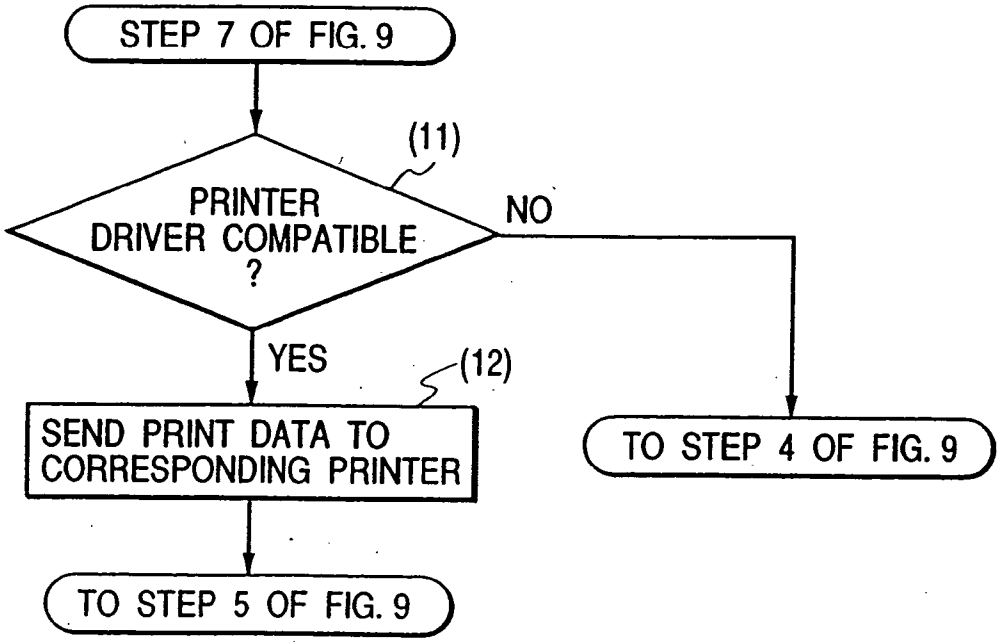


FIG. 12

MEMORY MAP OF MEM MEDIUM (FD/CD-ROM)

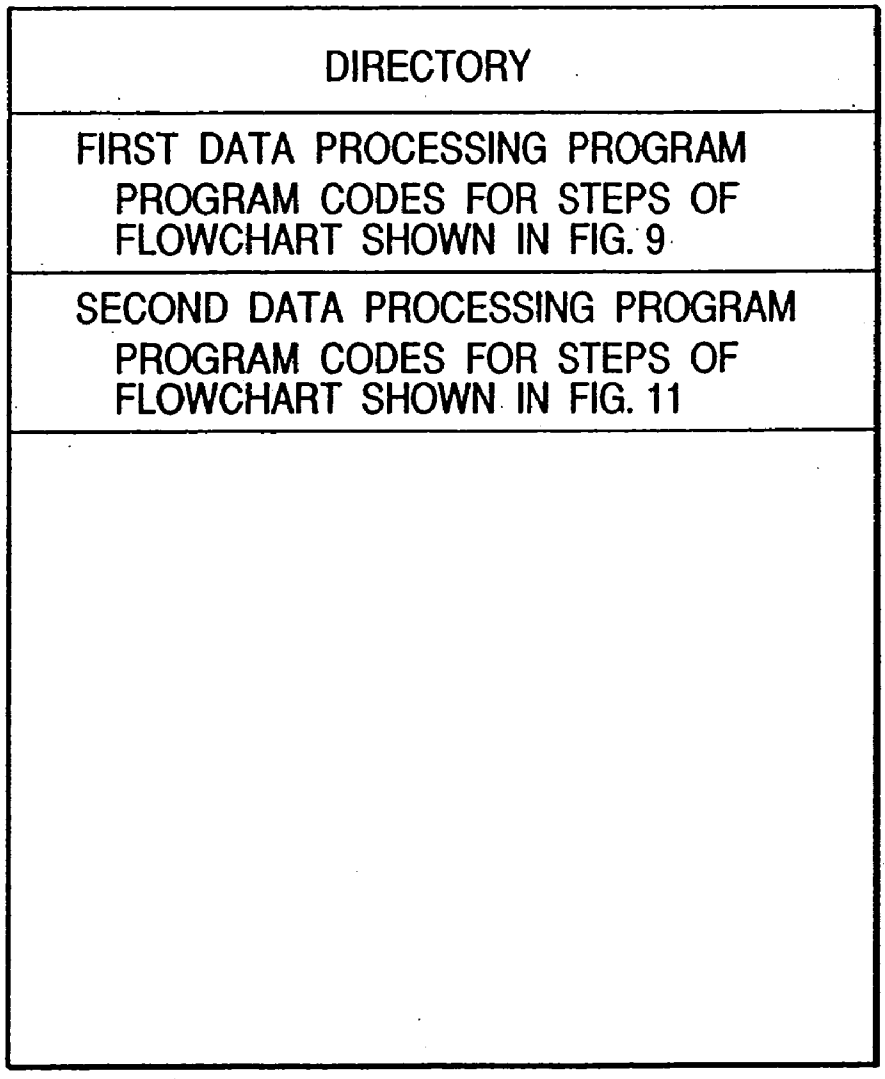


FIG. 13

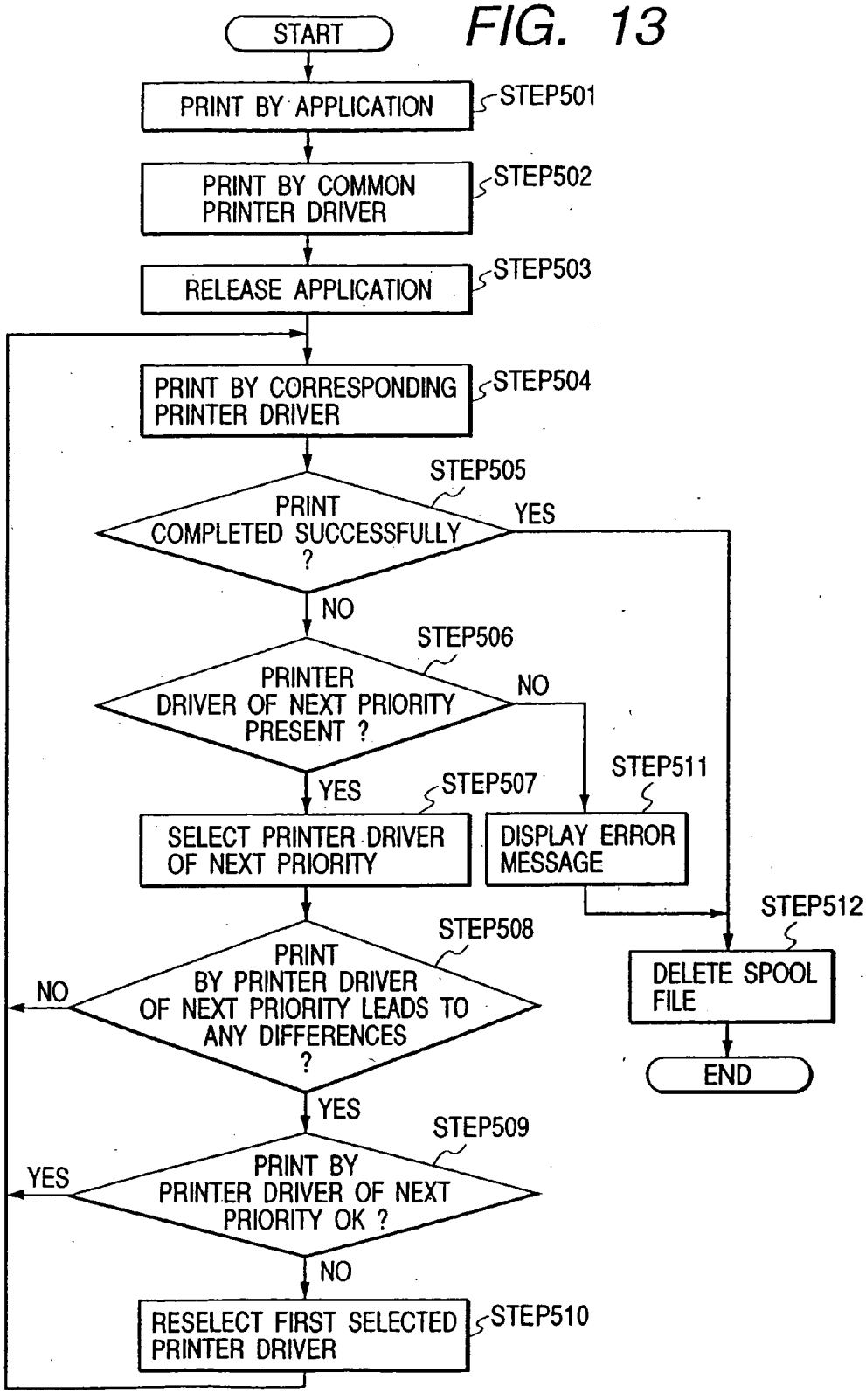

START
PRINT BY APPLICATION
STEP501
PRINT BY COMMON PRINTER DRIVER
STEP502
RELEASE APPLICATION
STEP503
PRINT BY CORRESPONDING PRINTER DRIVER
STEP504
STEP505
PRINT COMPLETED SUCCESSFULLY ?
YES
NO
STEP506
PRINTER DRIVER OF NEXT PRIORITY PRESENT ?
NO
YES
STEP507
STEP511
SELECT PRINTER DRIVER OF NEXT PRIORITY
DISPLAY ERROR MESSAGE
STEP512
STEP508
PRINT BY PRINTER DRIVER OF NEXT PRIORITY LEADS TO ANY DIFFERENCES ?
NO
DELETE SPOOL FILE
END
YES
STEP509
PRINT BY PRINTER DRIVER OF NEXT PRIORITY OK ?
YES
NO
RESELECT FIRST SELECTED PRINTER DRIVER
STEP510

FIG. 14

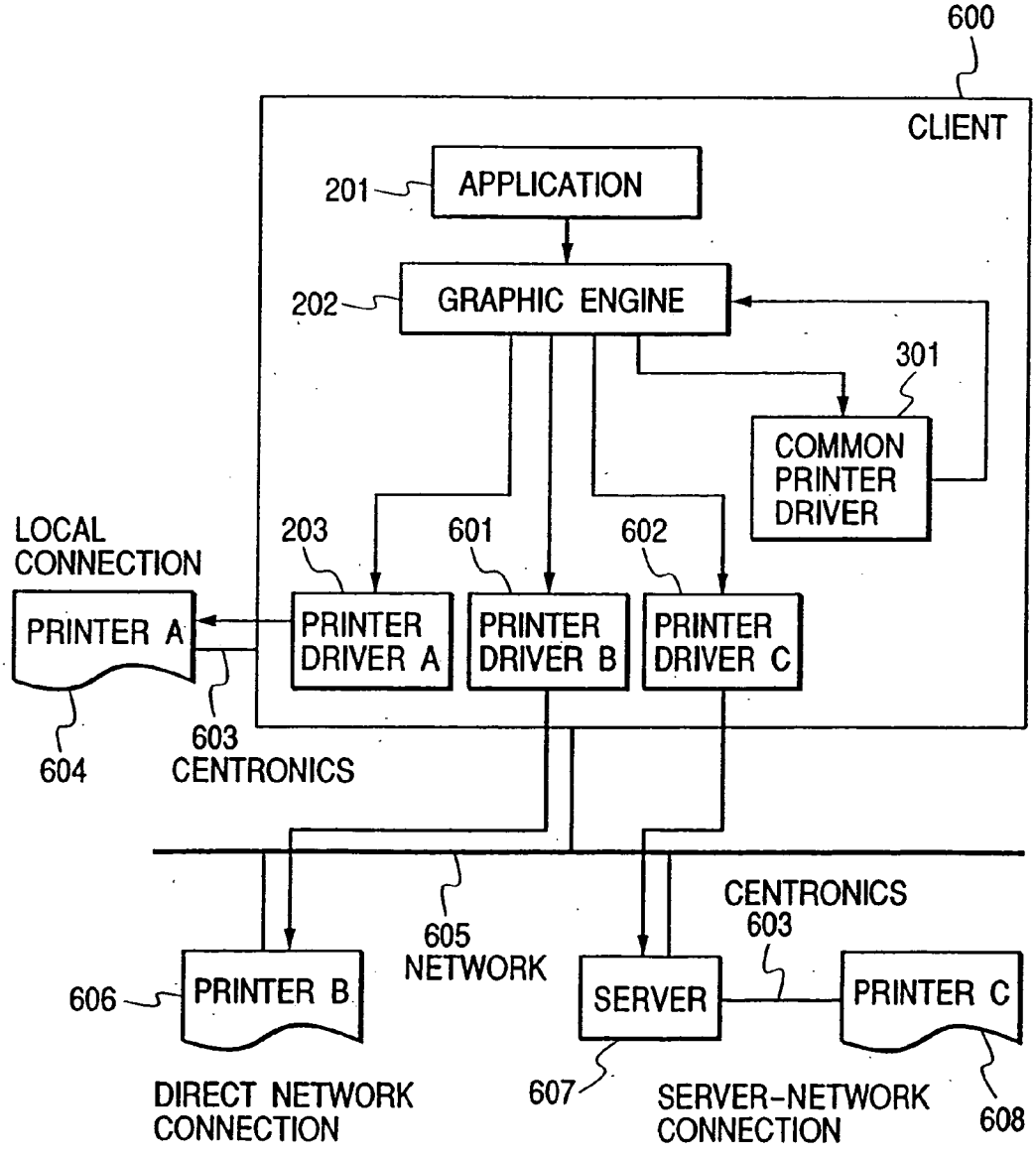

600
CLIENT
201
APPLICATION
202
GRAPHIC ENGINE
301
COMMON PRINTER DRIVER
LOCAL CONNECTION
203
601
602
PRINTER A
PRINTER DRIVER A
PRINTER DRIVER B
PRINTER DRIVER C
604
603 CENTRONICS
605 NETWORK
CENTRONICS 603
606
PRINTER B
SERVER
PRINTER C
DIRECT NETWORK CONNECTION
607
SERVER-NETWORK CONNECTION
608

FIG. 15

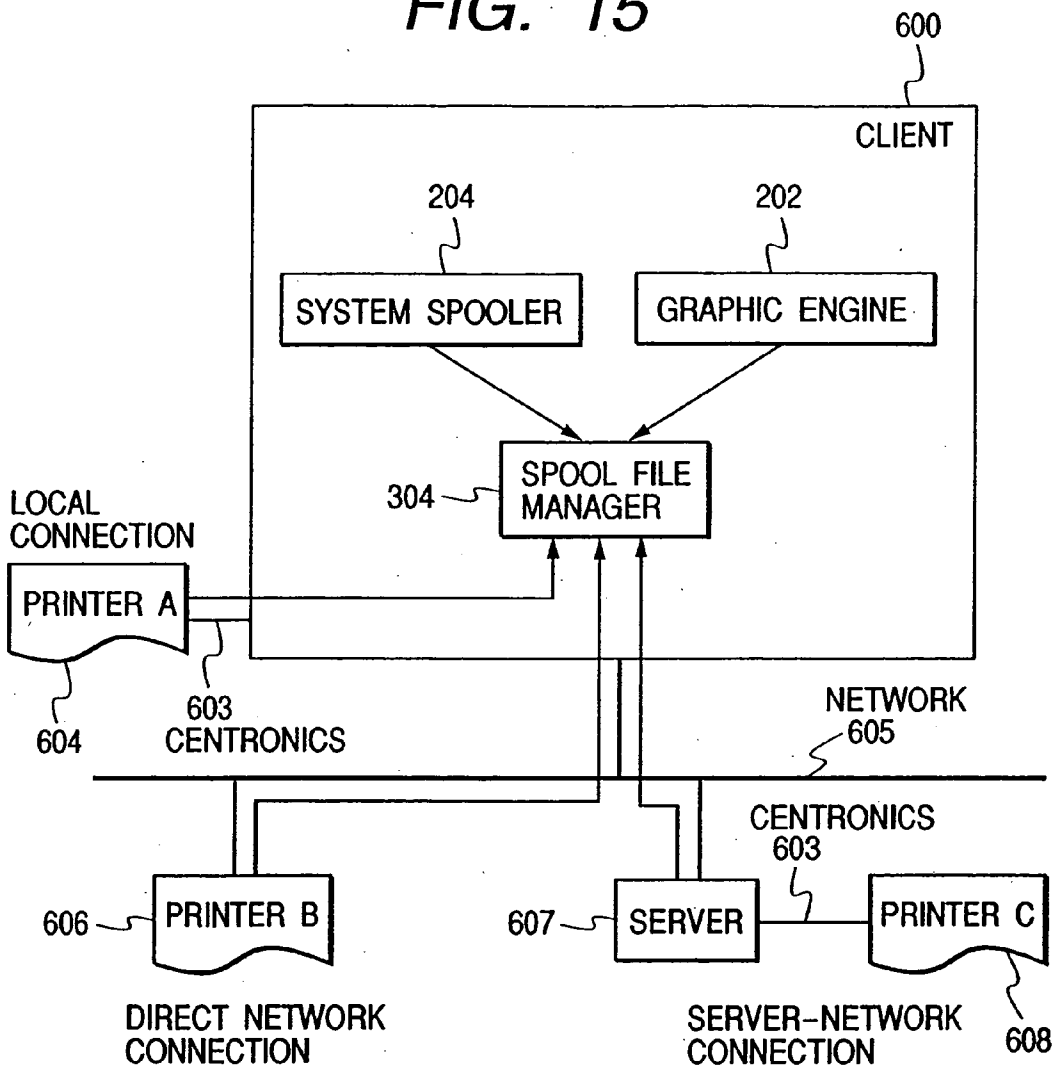

600
CLIENT
204
202
SYSTEM SPOOLER
GRAPHIC ENGINE
304
SPOOL FILE MANAGER
LOCAL CONNECTION
PRINTER A
604
603 CENTRONICS
NETWORK 605
CENTRONICS 603
606
PRINTER B
607
SERVER
PRINTER C
608
DIRECT NETWORK CONNECTION
SERVER-NETWORK CONNECTION

FIG. 16

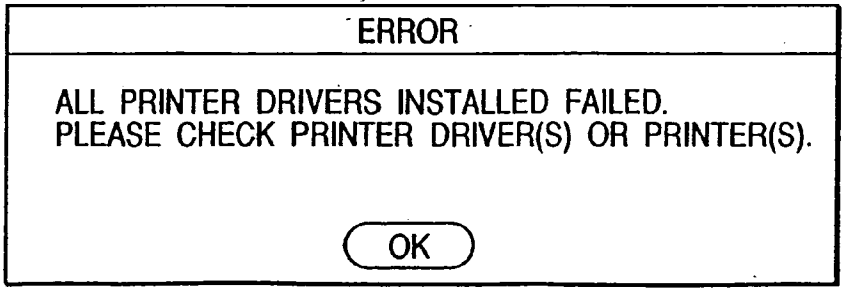

ERROR
ALL PRINTER DRIVERS INSTALLED FAILED.
PLEASE CHECK PRINTER DRIVER(S) OR PRINTER(S).
OK

FIG. 17

PRINTER AS SELECTED	PRINTER OF NEXT PRIORITY
PRINTER A	B → C
PRINTER B	A → C
PRINTER C	B → A

FIG. 18

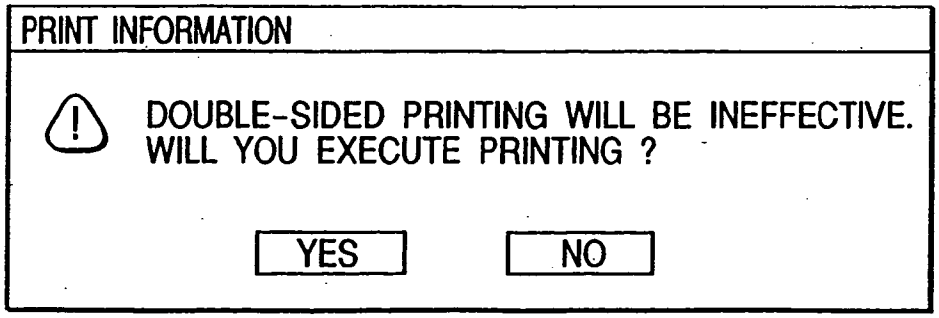
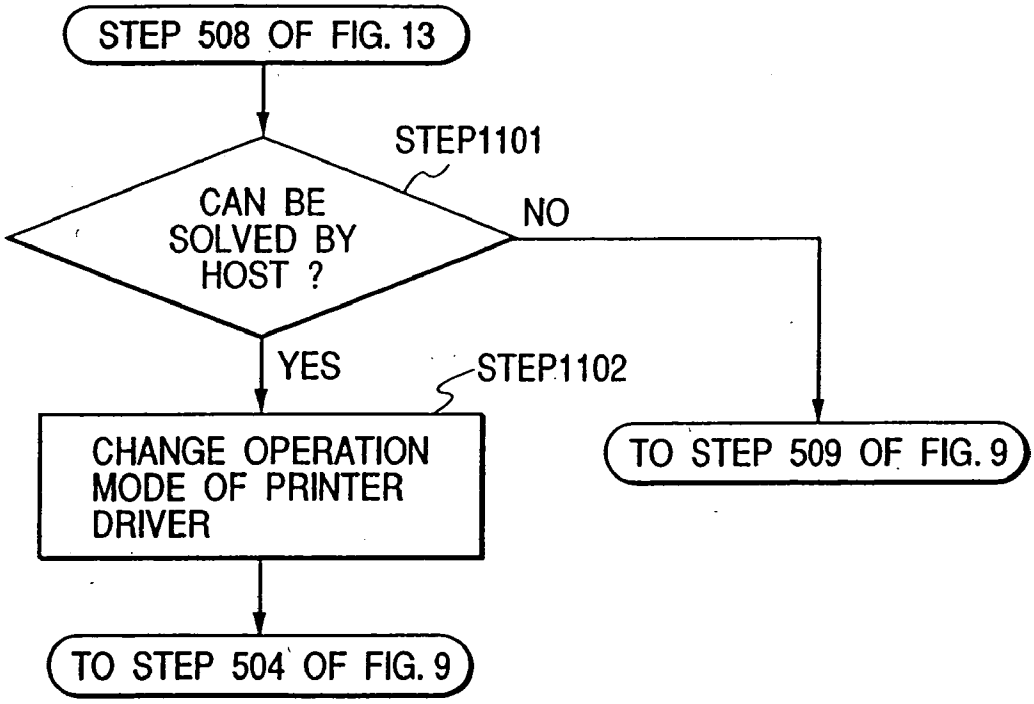


FIG. 19


STEP 508 OF FIG. 13
STEP1101
CAN BE SOLVED BY HOST ?
NO
YES
STEP1102
CHANGE OPERATION MODE OF PRINTER DRIVER
TO STEP 509 OF FIG. 9
TO STEP 504 OF FIG. 9

PRINT CONTROL METHOD AND APPARATUS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The invention relates to a print control apparatus which can transfer peculiar print information to a plurality of printing apparatuses through a predetermined communication medium. The invention also relates to a data processing method of such a print control apparatus and a memory medium in which a computer readable program to realize such a data processing method has been stored.

[0003] 2. Related Background Art

[0004] Hitherto, in case of executing a print from an application on a computer, print data of a format depending on a desired printing apparatus on the computer is formed by a printer driver corresponding to the desired printing apparatus and the print data is transmitted to the printing apparatus.

[0005] However, if a print is performed by using the printer driver depending on the printing apparatus at the time of execution of the print from the application as mentioned above, when a some error occurs during the generation of the print data of the printer driver, during the transmission of the print data, or during the print by the printing apparatus and the print is not successively completed, the user needs to allow the same printing apparatus to re-execute the print by the application or to allow another printing apparatus to execute the print.

SUMMARY OF THE INVENTION

[0006] The invention is made to solve the above problems and it is an object of the invention to provide a print control apparatus in which when an error occurs during a printing process to a selected printing apparatus, a printing apparatus of a next priority which is desired by the user is automatically selected and print control information that is optimum to the printing apparatus of a next priority is formed in a short time from a drawing object that has already been converted, thereby making it possible to freely establish a print processing environment such that an alternate printing process can be automatically performed by the printing apparatus of a next priority at the time of occurrence of a fault during the printing process. Another object of the invention is to provide a data processing method of such a print control apparatus and a memory medium in which a computer readable program to realize such a data processing method has been stored.

[0007] The invention is made in consideration of the foregoing conventional technique and it is still another object of the invention to provide print control apparatus and method which can avoid a fault during the execution of the print and can allow the print to be certainly performed without troubling the user.

[0008] Further another object of the invention is to enable a desired print output of the user to be performed by notifying the user of a problem occurring by changing a printing apparatus of the output destination side or by solving the problem by alternate means.

[0009] According to a first aspect of the invention, there is provided a print control apparatus which can communicate with a plurality of printing apparatuses via a predetermined communication medium, comprising: first converting means for converting drawing information which is required from an application into a drawing object which does not depend on each printing apparatus; storing means for storing the drawing object converted by the first converting means; a plurality of second converting means for converting the drawing object stored in the storing means into print control information that is peculiar to the printing apparatus that is selected and for transferring the print control information to each corresponding printing apparatus; discriminating means for discriminating the occurrence of a print processing error by monitoring a print processing state for a time interval from the start of the converting process by any one of the second converting means until a printing process of any one of the printing apparatuses is finished; and control means for selecting any one of the second converting means corresponding to the set other printing apparatus when it is determined by the discriminating means that the print processing error has occurred in such one of the printing apparatuses.

[0010] According to a second aspect of the invention, in the print control apparatus, the print processing error includes a conversion processing error by any one of the second converting means, a transfer error of the print control information which is converted by any one of the second converting means, and an engine operation error of any selected one of the printing apparatuses.

[0011] According to a third aspect of the invention, the print control apparatus further has: setting means for setting, every printing apparatus, the printing apparatus of a next priority to which the drawing object stored in the storing means should be transferred when the print processing error occurs; and memory means for storing a list of the printing apparatuses of a next priority which have been set by the setting means and to which the drawing object should be transferred, wherein the control means selects any one of the second converting means corresponding to another printing apparatus set in the list of the printing apparatuses of the next priority stored in the memory means.

[0012] According to a fourth aspect of the invention, the printing apparatus includes a local printer and network printers.

[0013] According to a fifth aspect of the invention, in the print control apparatus, the network printers include: a first network printer which is connected to the predetermined communication medium via a server; and a second network printer which is directly connected to the predetermined communication medium.

[0014] According to a sixth aspect of the invention, there is provided a data processing method of a print control apparatus which can communicate with a plurality of printing apparatuses via a predetermined communication medium, comprising: a first converting step of converting drawing information which is required from an application into a drawing object which does not depend on each printing apparatus; a storing step of storing the drawing object converted by the first converting step into a memory; a plurality of second converting steps of converting the drawing object stored in the memory by the storing step into print control information that is peculiar to the printing apparatus that is selected and transferring the print control

information to each corresponding printing apparatus; a discriminating step of discriminating the occurrence of a print processing error by monitoring a print processing state for a time interval from the start of the converting process by any one of the second converting steps until a printing process of any one of the printing apparatuses is finished; and a selecting step of selecting any one of the second converting steps corresponding to the set other printing apparatus when it is determined by the discriminating step that the print processing error has occurred in such one of the printing apparatuses.

[0015] According to a seventh aspect of the invention, in the data processing method, the print processing error includes a conversion processing error by any one of the second converting steps, a transfer error of the print control information which is converted by any one of the second converting steps, and an engine operation error of any selected one of the printing apparatuses.

[0016] According to an eighth aspect of the invention, the data processing method further has: a setting step of setting, every printing apparatus, the printing apparatus of a next priority to which the drawing object stored in the memory should be transferred when the print processing error occurs; and a registering step of registering a list of the printing apparatuses of a next priority which have been set by the setting step and to which the drawing object should be transferred into the memory, wherein in the selecting step, any one of the second converting steps corresponding to another printing apparatus set in the list of the printing apparatuses of the next priority stored in the memory is selected.

[0017] According to a ninth aspect of the invention, the printing apparatus includes a local printer and network printers.

[0018] According to a tenth aspect of the invention, in the data processing method, the network printers include: a first network printer which is connected to the predetermined communication medium via a server; and a second network printer which is directly connected to the predetermined communication medium.

[0019] According to an eleventh aspect of the invention, there is provided a memory medium in which a computer readable program for controlling a data processing apparatus which can communicate with a plurality of printing apparatuses via a predetermined communication medium has been stored, wherein the program comprises: a first converting step of converting drawing information which is required from an application into a drawing object which does not depend on each printing apparatus; a storing step of storing the drawing object converted by the first converting step into a memory; a plurality of second converting steps of converting the drawing object stored in the memory by the storing step into print control information that is peculiar to the printing apparatus that is selected and transferring the print control information to each corresponding printing apparatus; a discriminating step of discriminating the occurrence of a print processing error by monitoring a print processing state for a time interval from the start of the converting process by any one of the second converting steps until a printing process of any one of the printing apparatuses is finished; and a selecting step of selecting any one of the second converting steps corresponding to the set other printing apparatus when it is determined by the discriminating step that the print processing error has occurred in such one of the printing apparatuses.

[0020] According to a twelfth aspect of the invention, in the computer readable program stored in the memory medium, the print processing error includes a conversion processing error by any one of the second converting steps, a transfer error of the print control information which is converted by any one of the second converting steps, and an engine operation error of any selected one of the printing apparatuses.

[0021] According to a thirteenth aspect of the invention, the computer readable program stored in the memory medium has: a setting step of setting, every printing apparatus, the printing apparatus of a next priority to which the drawing object stored in the memory should be transferred when the print processing error occurs; and a registering step of registering a list of the printing apparatuses of a next priority which have been set by the setting step and to which the drawing object should be transferred into the memory, wherein in the selecting step, any one of the second converting steps corresponding to another printing apparatus set in the list of the printing apparatuses of the next priority stored in the memory is selected.

[0022] According to a fourteenth aspect of the invention, in the computer readable program stored in the memory medium, the printing apparatus includes a local printer and network printers.

[0023] According to a fifteenth aspect of the invention, in the computer readable program stored in the memory medium, the network printers include: a first network printer which is connected to the predetermined communication medium via a server; and a second network printer which is directly connected to the predetermined communication medium.

[0024] According to a sixteenth aspect of the invention, the print control apparatus further has second discriminating means for discriminating a compatibility between the printing apparatus of the next priority selected by the selecting means and a printing apparatus of a previous priority, wherein the control means transfers the converted print control information to the printing apparatus of the next priority when it is determined by the second discriminating means that there is the compatibility between the printing apparatus of the next priority and the printing apparatus of a previous priority.

[0025] According to a seventeenth aspect of the invention, the data processing method has: a second discriminating step of discriminating a compatibility between the printing apparatus of the next priority selected by the selecting step and a printing apparatus of a previous priority; and a transferring step of transferring the converted print control information to the printing apparatus of the next priority when it is determined by the second discriminating step that there is the compatibility between the printing apparatus of the next priority and the printing apparatus of the previous priority.

[0026] According to an eighteenth aspect of the invention, the computer readable program stored in the memory medium further has: a second discriminating step of discriminating a compatibility between the printing apparatus of the next priority selected by the selecting step and a

printing apparatus of a previous priority; and a transferring step of transferring the converted print control information to the printing apparatus of the next priority when it is determined by the second discriminating step that there is the compatibility between the printing apparatus of the next priority and the printing apparatus of the previous priority.

[0027] According to the invention, the above objects are accomplished by a print control apparatus comprising: print control means for forming data which does not depend on a printing apparatus to execute the print; means for converting the data which was formed by the print control means and does not depend on the printing apparatus into print data to an arbitrary printing apparatus; means for transmitting the print data to the printing apparatus; means for monitoring until the completion of the print of the transmitted print data; means for changing a printing apparatus on the output destination side on the basis of the data which does not depend on the printing apparatus in the case where the print is unsuccessfully completed due to some causes among the above three means, namely, during the conversion into the print data to the arbitrary printer, during the transmission of the print data, or before completion of the print in the printing apparatus, for converting into the print data to the changed printing apparatus, for sending it to the means for executing the print, and when a print instruction of the user before the change of the printing apparatus cannot be executed as it is by the changed printing apparatus on the output destination side, for notifying the user of such a fact; and means for allowing the user to select whether the subsequent print is continued or not and, when the user selects the stop of the print, for allowing the printing apparatus before the change to re-execute the print.

[0028] The print control apparatus further has means for, when the print instruction of the user cannot be executed because a shortage of an ability of the printing apparatus after the change, modifying the print data which is sent to the printing apparatus on the basis of the data which does not depend on the printing apparatus and for substituting the print instruction of the user.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] **FIG. 1** is a block diagram for explaining a construction of a print system to which a data processing apparatus showing the first embodiment of the invention can be applied;

[0030] **FIG. 2** is a block diagram for explaining a construction of a host computer in the print system shown in **FIG. 1**;

[0031] **FIG. 3** is a block diagram for explaining in detail the construction of a host computer in the print system shown in **FIG. 1**;

[0032] **FIG. 4** is a block diagram showing a memory map in a state where a print associated module including a print mode automatic control program in the embodiment has been loaded into an RAM **2** of a host computer **3000** and can be executed;

[0033] **FIG. 5** is a block diagram for explaining the first print processing format in the print system according to the invention;

[0034] **FIG. 6** is a block diagram for explaining the second print processing format in the print system according to the invention;

[0035] **FIG. 7** is a diagram showing an example of a dialog message which is displayed in a display section of a client shown in **FIGS. 5 and 6**;

[0036] **FIG. 8** is a diagram showing an example of a priority table of printer selection candidates which are stored and managed in the RAM **2** shown in **FIG. 1** or an external memory;

[0037] **FIG. 9** is a flowchart showing an example of the first data processing procedure in the data processing apparatus according to the invention;

[0038] **FIG. 10** is a diagram showing an example of a printer selection priority table which is stored in a data processing apparatus showing the second embodiment of the invention;

[0039] **FIG. 11** is a flowchart showing an example of the second data processing procedure in the data processing apparatus according to the invention;

[0040] **FIG. 12** is a diagram for explaining a memory map of a memory medium to store various data processing programs which can be read out by the print system to which the data processing apparatus according to the invention can be applied;

[0041] **FIG. 13** is a flowchart showing the contents of the processes in the embodiment;

[0042] **FIG. 14** is a diagram showing an example of a system construction in the embodiment;

[0043] **FIG. 15** is a diagram showing an example of a construction to monitor whether the print has successfully completed or not;

[0044] **FIG. 16** is a diagram showing a display example of an error message when the print is unsuccessfully completed;

[0045] **FIG. 17** is a diagram showing an example of information indicative of the print priority;

[0046] **FIG. 18** is a diagram showing a display example of a message which is displayed when there is a print designation which is made ineffective in case of executing the print by a printer of a next priority; and

[0047] **FIG. 19** is a flowchart showing the contents of processes in another embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0048] [First Embodiment]

[0049] **FIG. 1** is a block diagram for explaining a construction of a print system to which a data processing apparatus showing the first embodiment of the invention can be applied. The invention can be applied to any one of single equipment, a system comprising a plurality of equipment, and a system which is connected through a network such as LAN, WAN, or the like and executes processes so long as the functions of the invention are executed.

[0050] In the diagram, a host computer **3000** has a CPU **1** to execute a process of a document in which a figure, an image, characters, a table (including a spreadsheet or the like) and the like mixedly exist on the basis of a document processing program or the like stored in a program ROM in

an ROM **3** or an external memory **11**. Each device connected to a system bus **4** is integratedly controlled by the CPU **1**.

[**0051**] An operating system program (hereinafter, abbreviated as an OS) as a control program of the CPU **1** or the like is stored in the program ROM in the ROM **3** or the external memory **11**. Font data and the like which is used when performing the image processes are stored in a font ROM in the ROM **3** or the external memory **11**. Various data which is used when performing the image processes or the like is stored in a data ROM in the ROM **3** or the external memory **11**. An RAM **2** functions as a main memory, a work area, or the like of the CPU **1**.

[**0052**] Reference numeral **5** denotes a keyboard controller (KBC) to control a key input from a keyboard **9** or a pointing device (not shown); **6** a CRT controller (CRTC) to control a display of a CRT display (CRT) **10**; and **7** a disk controller (DKC) to control an access to the external memory **11** such as hard disk (HD), floppy disk (FD), or the like to store a boot program, various applications, font data, a user file, an edition file, a printer control command forming program (hereinafter, referred to as a printer driver) including a print control program, and the like.

[**0053**] Reference numeral **8** denotes a printer controller (PRTC) which is connected to a printer **1500** through a bidirectional interface (interface: I/F) **21** and executes a communication control process with the printer **1500**.

[**0054**] The CPU **1** executes, for example, a developing (rasterizing) process of outline fonts to a display information RAM set on the RAM **2**, thereby enabling WYSIWYG to be executed on the CRT **10**. The CPU **1** opens various registered windows on the basis of commands instructed by a mouse cursor or the like (not shown) on the CRT **10** and executes various data processes. When executing the print, the user opens a window regarding the setting of the print and can set a printer and a print processing method for a printer driver including the selection of a print mode.

[**0055**] In the printer **1500**, reference numeral **12** denotes a printer CPU (CPU) to output an image signal as output information to a printing section (printer engine) **17** connected to a system bus **15** on the basis of a control program or the like stored in a program ROM in the ROM **13** or a control program or the like stored in an external memory **14**. The control program of the CPU **12** and the like are stored in a program ROM in the ROM **13**. Font data and the like which are used when the output information is formed are stored in a font ROM in the ROM **13**. In case of a printer without the external memory **14** such as a hard disk or the like, information and the like which is used on the host computer have been stored in a data ROM in the ROM **13**. Reference numeral **1000** denotes a printer control unit.

[**0056**] The CPU **12** can communicate with the host computer **3000** through an input section **18** and can notify the host computer **3000** of information or the like in the printer. An RAM **19** is an RAM which functions as a main memory, a work area, or the like of the CPU **12** and is constructed so that a memory capacity can be expanded by an option RAM which is connected to an expansion port (not shown). The RAM **19** is used as an output information rasterizing area, an environment data storing area, an NVRAM, or the like. An access to the external memory **14** such as hard disk (HD), IC card, or the like mentioned above is controlled by a memory controller (MC) **20**. The external memory **14** is connected as an option and stores font data, an emulation program, form data, and the like. Switches, an LED display, and the like for operation are arranged on an operation panel **1501**.

[**0057**] As for the external memory **14**, the number of external memories is not limited to one but a plurality of external memories can be provided. That is, it is also possible to construct such that in addition to built-in fonts, option cards and a plurality of external memories in which programs to interpret printer control languages of different language systems have been stored can be connected. Further, the apparatus can also have an NVRAM (not shown) and store printer mode set information from the operation panel **1501**.

[**0058**] **FIG. 2** is a block diagram for explaining a construction of the first host computer in the print system shown in **FIG. 1** and corresponds to a construction of a program module on the host computer. The embodiment can be applied to a case of a host computer such that the host computer **3000** and printer **1500** are directly connected or are connected via the network.

[**0059**] In the diagram, an application **201**, a graphic engine **202**, a printer driver **203**, and a system spooler **204** exist as files saved in the external memory **11** and function as a program module which is loaded into the RAM **2** and is executed by the OS or a module using the program module.

[**0060**] The application **201** and printer driver **203** can be installed at any time into an FD or a CD-ROM (not shown) as an external memory **11** or into an HD as an external memory **11** via a network (not shown). The application **201** saved in the external memory **11** is loaded into the RAM **2** and is executed. However, when the print is performed from the application **201** to the printer **1500**, print data is outputted (drawn) by using the graphic engine **202** which has similarly been loaded in the RAM **2** and can be executed.

[**0061**] The graphic engine **202** similarly loads the printer driver **203** prepared every printing apparatus from the external memory **11** into the RAM **2** and converts the output of the application **201** into a control command of the printer **1500** by using the printer driver **203**. The converted printer control command is outputted to the printer **1500** via the interface **21** through the system spooler **204** loaded in the RAM **2** by the OS.

[**0062**] Although the embodiment is made with respect to the print system comprising the printer and the host computer shown in **FIG. 2** as a prerequisite, it is made further with regard to a system such that the print data from the application is once spooled by intermediate code data as shown in **FIG. 3**, which will be explained hereinlater, as a prerequisite.

[**0063**] **FIG. 3** shows a construction which is obtained by expanding the system of **FIG. 2** and in which a spool file **303** comprising intermediate codes is once formed when a print command is transmitted from the graphic engine **202** to the printer driver **203**. In the print system shown in **FIG. 2**, the application **201** is released from the printing process at a time point when the printer driver **203** completes the conversion of all of print commands from the graphic engine **202** into control commands of the printer. In the system shown in **FIG. 3**, however, the application is released at a

time point when a spooler **302** converts all print commands into intermediate code data and outputs them to the spool file **303**. Usually, the processing time in the latter system is shorter than that in the former system. **FIG. 3** will now be described in detail hereinbelow.

[**0064**] **FIG. 3** is a block diagram for explaining a construction of a second host computer in the print system shown in **FIG. 1** and the same component elements as those shown in **FIG. 1** are designated by the same reference numerals. A construction and the operation will now be described hereinbelow.

[**0065**] In the expanded processing system, a common printer driver **301** receives a print command from the graphic engine **202**. When the print command received by the common printer driver **301** from the graphic engine **202** is a print command issued from the application **201** to the graphic engine **202**, the common printer driver **301** loads the spooler **302** stored in the external memory **11** into the RAM **2** and sends the print command to the spooler **302** instead of the printer driver **203**. The spooler **302** converts the received print command into an intermediate code and outputs it to the spool file **303**.

[**0066**] The spooler **302** obtains modification set contents regarding the print data set for the printer driver **203** from the printer driver **203** and saves into the spool file **303**.

[**0067**] Although the spool file **303** is formed as a file on the external memory **11**, it can be also formed on the RAM **2**. Further, the spooler **302** loads a spool file manager **304** stored in the external memory **11** into the RAM **2** and notifies the spool file manager **304** of a forming situation of the spool file **303**. After that, when it is determined that the print can be performed by again using the graphic engine **202**, the spool file manager **304** loads a despooler **305** stored in the external memory **11** into the RAM **2** and instructs the despooler **305** to perform the printing process of the intermediate code described in the spool file **303**.

[**0068**] The despooler **305** again outputs the intermediate code included in the spool file **303** to the printer driver **203** via the graphic engine **202**. The printer driver **203** forms a printer control command and outputs it to the printer **1500** via the system spooler **204**.

[**0069**] **FIG. 4** is a diagram showing an example of a memory map in the RAM **2** shown in **FIG. 1** and corresponds to a state where the print program has been loaded into the RAM **2** on the host computer **3000** and can be executed. The print control program in the embodiment exists as a part of a print associated program **404**.

[**0070**] In the diagram, reference numeral **401** denotes an application which is loaded from the external memory **11** or the like into the RAM **2**; **402** a free memory which functions as a work memory of the CPU **1**; **403** associated data; **404** the print associated program which is loaded from the external memory **11** or the like into the RAM **2**; **405** an OS; and **406** a BIOS to control input/output devices (I/O devices).

[**0071**] **FIG. 5** is a block diagram for explaining the first print processing format in the print system according to the invention. Particularly, **FIG. 5** corresponds to an example of the system in which printer drivers **203**, **601**, and **602** corresponding to printers which are local connected, directly network connected, and connected via a server and the common printer driver **301** exist in a client **600** to form print data.

[**0072**] In the diagram, the common printer driver **301** forms print data which does not depend on each printing apparatus on the network. Reference numeral **601** denotes the printer driver to form print data which depends on a printer **606**; **602** the printer driver to form print data which depends on a printer **608** connected to a server **607**; and **604** a printer which is connected as a local printer of the client **600** through a centronics interface **603**.

[**0073**] The printer **608** is connected to the server **607** so that it can communicate therewith via the centronics I/F **603**. The printer **606** has a network card and communicates with the printer driver **601** in accordance with a predetermined protocol.

[**0074**] **FIG. 6** is a block diagram for explaining the second print processing format in the print system according to the invention and the same component elements as those shown in **FIGS. 1 and 5** are designated by the same reference numerals.

[**0075**] In the diagram, the spool file manager **304** monitors whether the print in each of the printers **604**, **606**, and **608** has successfully completed or not.

[**0076**] A characteristic construction of the embodiment will now be described hereinbelow with reference to **FIG. 5** and the like.

[**0077**] There is provided a print control apparatus with the above construction which can communicate with a plurality of printing apparatuses (printers **604**, **606**, **608**) through a predetermined communication medium (including the network and interface). The above print control apparatus comprises: first converting means (common printer driver **301**) for converting drawing information which is required from the application **201** into a drawing object which does not depend on each printing apparatus; storing means for storing the drawing object converted by the first converting means; a plurality of second converting means (printer drivers **203**, **601**, **602**) for converting the drawing object stored in the storing means into print control information that is peculiar to the printing apparatus that is selected and for transferring the print control information to each corresponding printing apparatus; discriminating means (spool file manager **304**) for discriminating the occurrence of a print processing error by monitoring a print processing state for a time interval from the start of the converting process by any one of the second converting means until a printing process of any one of the printing apparatuses is finished; and control means for selecting any one of the second converting means corresponding to the set other printing apparatus when it is determined by the discriminating means that the print processing error has occurred in such one of the printing apparatuses (the CPU **1** of the host computer **3000** executes the control program stored in the ROM **3** or external memory **11** and performs a selection control). Therefore, the drawing object which does not depend on each printing apparatus is held until the printing process is successfully completed in the selected one of the printing apparatuses. When some error occurs during the printing process for the printing apparatus selected by the user, the set next alternate printing apparatus is selected. The peculiar

print control information is converted from the stored drawing object and can be sequentially transferred to the selected printing apparatus. The selection burden of the candidates of the printing apparatuses of the user can be reduced. The print control information can be soon transferred to the printing apparatus of the next priority. The print environment such that the print processing time can be remarkably reduced and the printing process can be efficiently performed can be established.

[0078] Since the print processing error includes a conversion processing error by any one of the second converting means, a transfer error of the print control information which is converted by any one of the second converting means, and an engine operation error (for example, paper jam) of any selected one of the printing apparatuses. Therefore, the print processing error during a series of printing process is captured and the printing process can be dynamically switched from the selected printing apparatus to the printing process for the set other printing apparatus.

[0079] Further the print control apparatus has: setting means for setting, every printing apparatus, the printing apparatus of a next priority to which the drawing object stored in the storing means should be transferred when the print processing error occurs (the user arbitrarily sets by a GUI (not shown) of the host computer **3000**); and memory means for storing a list of the printing apparatuses of a next priority which have been set by the setting means and to which the drawing object should be transferred (it is stored into the external memory **11** or the like and is loaded onto the RAM **2**), wherein the control means selects any one of the second converting means corresponding to another printing apparatus set in the list of the printing apparatuses of the next priority (refer to the table shown in **FIG. 8**) stored in the memory means. Therefore, the print control information which is converted from the drawing object stored for the desired printing apparatus can be sequentially transferred in accordance with the priorities which are desired by the user.

[0080] Since the printing apparatus includes a local printer (printer **604**) and network printers (printers **606** and **608**), the alternate printing apparatus candidates at the time of the occurrence of a fault can be freely selected from various print environments.

[0081] Further, the network printers include: a first network printer (printer **606**) which is connected to the predetermined communication medium via a server; and a second network printer (printer **608**) which is directly connected to the predetermined communication medium. Therefore, the alternate network printer candidates at the time of the occurrence of a fault can be freely selected from various network printer environments.

[0082] The print control apparatus has second discriminating means for discriminating a compatibility between the printing apparatus of the next priority selected by the selecting means and the printing apparatus of the previous priority (the CPU **1** of the host computer **3000** executes the control program stored in the ROM **3** or external memory **11** and discriminates). The control means transfers the converted print control information to the printing apparatus of the next priority when it is determined by the second discriminating means that there is the compatibility between the printing apparatus of the next priority and the printing apparatus of the previous priority. Therefore, when an error occurs during the printing process to the selected printing apparatus, if the printing apparatus that is selected as a printing apparatus of the next priority has the compatibility with the printing apparatus of the previous priority, the print control information which has already been converted can be directly transferred. The re-converting process becomes unnecessary. The print processing time in the printing apparatus of the next priority can be remarkably reduced.

[0083] **FIG. 7** is a diagram showing an example of a dialog message which is displayed in the display section of the client shown in **FIGS. 5 and 6** and corresponds to an example of a message when the print is unsuccessfully completed.

[0084] **FIG. 8** is a diagram showing an example of a priority table of printer selection candidates which are stored and managed in the RAM **2** or external memory **11** shown in **FIG. 1** and it is set every printer to be selected.

[0085] **FIG. 9** is a flowchart showing an example of the first data processing procedure in the data processing apparatus according to the invention. Reference numerals (**1**) to (**9**) denote processing steps. A processing routine in the embodiment is loaded onto the RAM **2** under the management of the OS **405** as shown in **FIG. 4** by operating the keyboard controller **5** or the like shown in **FIG. 1** by the user and is started when the user designates a printer on the print destination side and instructs the execution of the print by the application **201** that is being executed.

[0086] For example, as shown in **FIG. 5**, when the print data can be outputted from the application **201** which operates on the client **600** to the three printers **604**, **606**, and **608** by using the printer drivers **203**, **601**, and **602**, respectively, the user selects any one of the printer drivers **203**, **601**, and **602** and executes the print. In the following description using flowcharts of the embodiment, it is assumed that the printer driver selected by the user is the printer driver **203**.

[0087] When the print start is instructed by the user, first in step (**1**), the application **201** allows the graphic engine **202** to execute the print command until all of the print data is extinguished. Subsequently, the graphic engine **202** which received the print command from the application **201** accesses the common printer driver **301** onto the RAM **2** in place of the printer driver **203** designated by the user and executes the print.

[0088] The common printer driver **301** accesses the spooler **302**, converts the received print, command into the intermediate code of the print command, and saves it into the spool file **303**. As mentioned above, when the common printer driver **301** converts all of the print commands from the graphic engine **202** into the intermediate codes, saves them into the spool file **303**, and finishes the processes, the application **201** is released in step (**3**).

[0089] Subsequently in step (**4**), as already described in **FIG. 3**, the printer driver **203** corresponding to the printer **604** in which the print has been designated by the user via the spool file manager **304**, despooler **305**, and graphic engine **202** is set to an output destination and the print is executed.

[0090] In step (**5**), the spool file manager **304** discriminates whether the print has successfully been completed or

not. The actual confirmation is performed by monitoring a processing situation of each module (whether it has successfully been completed or unsuccessfully completed) in a flow of the printing process. In the embodiment, as shown in **FIG. 6**, the successful completion is discriminated by monitoring the states of the graphic engine **202**, system spooler **204**, and printers **604**, **606**, and **608**. As examples of the unsuccessful completion, a shortage of a memory capacity in the graphic engine **202**, a shortage of the disk, a transmission error of the data to the printer in the system spooler **204**, a paper jam in the printer, and the like can be mentioned.

[**0091**] When it is decided in step (**5**) that the print has successfully been completed, the spool file manager **304** deletes the spool file **303** in step (**9**) and all of the processes are finished.

[**0092**] When it is determined in step (**5**) that the print is not successfully completed, a check is made in step (**6**) to see if there is a printer driver of a next priority among the printer drivers which can be used in the host computer **3000**. In the embodiment, as shown in **FIG. 8**, as a deciding method of the printer driver of the next priority, the user previously stores a table in which the priorities have been defined into the RAM **2** or external memory **11** and sequentially traces the priority defined table, so that it can be decided. As another method of deciding the printer driver of the next priority, it is also possible to use a method whereby the information which the printer drivers have is collected from each printer driver and stored into the external memory **11**, a table showing the priorities of the printer drivers similar to the table of **FIG. 8** is formed on the basis of those information in accordance with the compatibility with the printer driver designated as a print destination side upon print execution, location information of the printer (where the printer is installed), and the like, thereby deciding.

[**0093**] When it is determined in step (**6**) that there is the printer driver of the next priority, this driver is selected as a driver of the next priority in step (**7**). The processing routine is returned to step (**4**) and the despooler **305** instructs the graphic engine **202** to re-execute the print of the contents of the spool file **303**.

[**0094**] In case of the embodiment, since the printer of the next priority of the printer **604** is the printer **608** as shown in **FIG. 8**, the printer driver **601** is selected as a driver of the next priority. As mentioned above, the printing process is performed while switching the printer drivers until the print is successfully completed or there is no printer driver of the next priority.

[**0095**] When it is determined in step (**6**) that the driver of the next priority does not exist, to notify the user of the result of the unsuccessful completion of the print, the error message shown in **FIG. 7** is displayed to the CRT **10** in step (**8**). Subsequently in step (**9**), the spool file **303** is deleted and the processing routine is finished.

[**0096**] All of the printing processes from the application are finished by the above processes. The processes of the printing program in the embodiment are also finished and the data is deleted from the RAM **2** by the function of the OS **405**.

[**0097**] In the embodiment, although the external memory **11** is used as a medium to record the printing program, any one of an FD drive, an HD drive, a CD-ROM, an IC memory card, and the like can be also used as an external memory **11**.

[**0098**] Further, it is also possible to construct such that the printing program is recorded solely in the ROM **3** or is recorded therein together with programs which operate on the OS or the other host computer and is constructed so as to form a part of the memory map and is directly executed by the CPU **1**.

[**0099**] A characteristic construction of the embodiment will now be described hereinbelow with reference to **FIG. 9** or the like.

[**0100**] There is provided a data processing method with the above construction of a print control apparatus which can communicate with a plurality of printing apparatuses via a predetermined communication medium (including a network and an interface) or there is provided a memory medium with the above construction in which a computer readable program for controlling a data processing apparatus which can communicate with a plurality of printing apparatuses through a predetermined communication medium has been stored. The above data processing method or the above computer readable program stored in the memory medium comprises: a first converting step (step (**2**) in **FIG. 9**) of converting drawing information which is required from an application into a drawing object which does not depend on each printing apparatus; a storing step (step (**2**) in **FIG. 9**) of storing the drawing object converted by the first converting step into a memory; a plurality of second converting steps (step (**4**) in **FIG. 9**) of converting the drawing object stored in the memory by the storing step into print control information that is peculiar to the printing apparatus that is selected and transferring the print control information to each corresponding printing apparatus; a discriminating step (step (**5**) in **FIG. 9**) of discriminating the occurrence of a print processing error by monitoring a print processing state for a time interval from the start of the converting process by any one of the second converting steps until a printing process of any one of the printing apparatuses is finished; and a selecting step (steps (**6**) and (**7**) in **FIG. 9**) of selecting any one of the second converting steps corresponding to the set other printing apparatus when it is determined by the discriminating step that the print processing error has occurred in such one of the printing apparatuses. Therefore, the drawing object which does not depend on each printing apparatus is held until the printing process is successfully completed in the selected one of the printing apparatuses, and when some error occurs during the printing process to the printing apparatus selected by the user, the set next alternate printing apparatus is selected, and the peculiar print control information is converted from the stored drawing object and can be sequentially transferred to the selected printing apparatus. The selection burden of the printing apparatus candidates of the user can be reduced. The print control information can be soon transferred to the printing apparatus of the next priority. The print environment in which the print processing time is remarkably reduced and the printing process can be efficiently performed can be established.

[**0101**] The print processing error includes a conversion processing error by any one of the second converting steps, a transfer error of the print control information which is converted by any one of the second converting steps, and an

engine operation error of any selected one of the printing apparatuses. Therefore, the print processing error during the series of printing processes is captured and the printing process can be dynamically switched from the selected printing apparatus to the set other printing apparatus.

[0102] Further, the data processing method or the computer readable program stored in the memory medium further has: a setting step (not shown) of setting, every printing apparatus, the printing apparatus of a next priority to which the drawing object stored in the memory should be transferred when the print processing error occurs; and a registering step (not shown) of registering a list of the printing apparatuses of a next priority which have been set by the setting step and to which the drawing object should be transferred into the memory, wherein the selecting step selects any one of the second converting steps corresponding to another printing apparatus set in the list of the printing apparatuses of the next priority stored in the memory. Therefore, the print control information which is converted from the drawing object stored can be sequentially transferred to the desired printing apparatus in accordance with the priority which is desired by the user.

[0103] Since the printing apparatus includes a local printer (printer **604**) and network printers (printers **606** and **608**), the alternate printing apparatus candidate at the time of the occurrence of a fault can be freely selected from various print environments.

[0104] Further, the network printers include: a first network printer (printer **606**) which is connected to the predetermined communication medium via a server; and a second network printer (printer **608**) which is directly connected to the predetermined communication medium. Therefore, the alternate network printer candidate at the time of the occurrence of a fault can be freely selected from various network printer environments.

[0105] [Second Embodiment]

[0106] The first embodiment has a structure such that when it is detected in step (**5**) shown in **FIG. 9** that the print is not successfully completed, the printer driver of the next priority is determined in step (**7**) and the print is re-executed by using the printer driver selected as a printer driver of the next priority. However, as shown in **FIG. 10**, it is also possible to construct in a manner such that a compatibility flag is added to the table showing the priorities and the formed print data when the print is not successfully completed is transmitted to the printer of the next priority without re-executing the print, thereby re-executing the print. Such an embodiment will now be described hereinbelow.

[0107] **FIG. 10** is a diagram showing an example of a printer selection priority table which is stored in the data processing apparatus showing the second embodiment of the invention. It is assumed that this table is stored in the external memory **11** or the like.

[0108] **FIG. 11** is a flowchart showing an example of the second data processing procedure in the data processing apparatus according to the invention and only a main procedure is shown. Reference numerals (**11**) and (**12**) denote processing steps and the other processes are similar to those in **FIG. 9**.

[0109] Although not shown, in the print execution by the printer driver on the output destination in step (**4**) shown in **FIG. 9**, the print data formed by the printer driver is generally written into a temporary saving file which is managed by the system spooler **204** and, after that, it is transmitted to the printer actually connected to the client **600**. In the embodiment, however, the output of the printer driver is once written and saved into the temporary saving file under the management of the spool file manager **304**. After the saving was finished, the writing and saving of the print data into the temporary saving file which is managed by the system spooler **204** are performed in a final print data format.

[0110] The temporary saving file under the management of the spool file manager **304** is deleted by the spool file deleting process in step (**9**) in a manner similar to the spool file **303** of the intermediate code format.

[0111] First in step (**7**) shown in **FIG. 9**, when it is known that the printer driver is the driver of the next priority, a check is further made in step (**11**) to see if the driver of the next priority has a compatibility with the printer driver which has already performed the print with reference to the table shown in **FIG. 10**. When it is decided that there is no compatibility, the processing routine is returned to the process in step (**4**) shown in **FIG. 9**.

[0112] When it is determined in step (**11**) that there is the compatibility, the file of the final print data format managed by the spool file manager **304** is opened in step (**12**) and the data is transmitted to the printer on the output destination side. After completion of this process, the processing routine is returned to the process in step (**5**) shown in **FIG. 9**.

[0113] For example, when the printer designated by the user as an output destination is the printer **604** and some error occurs before the end of the print to the printer, it is known that the printer of the next priority is the printer **606** and the compatibility exists in accordance with the next candidate information and the compatibility information shown in **FIG. 10**.

[0114] In this case, therefore, there is no need to re-execute the print to the graphic engine **202** by using the spool file **303** of the intermediate data format which is managed by the spool file manager **304**. By transmitting the temporary saving file saved in the final print data format to the printer, the print to the printer **606** is performed. If the print is not successfully completed even in the printer **606**, since it is known that the printer **608** is the final candidate and there is no compatibility with reference to the item of the printer **604** shown in **FIG. 10**, the ordinary printing process by step (**4**) is executed to the printer **608**.

[0115] A characteristic construction of the embodiment will now be described hereinbelow with reference to a flowchart shown in **FIG. 11**.

[0116] There is provided a data processing method with the above construction of a print control apparatus which can communicate with a plurality of printing apparatuses through a predetermined communication medium or there is provided a memory medium in which a computer readable program for controlling a data processing apparatus which can communicate with a plurality of printing apparatuses through a predetermined communication medium has been stored. The above data processing method or the above

computer readable program stored in the memory medium has: a second discriminating step (step (11) in **FIG. 11**) of discriminating a compatibility between the printing apparatus of the next priority selected by the selecting step and a printing apparatus of a previous priority; and a transferring step (step (12) in **FIG. 11**) of transferring the converted print control information to the printing apparatus of the next priority when it is determined by the second discriminating step that there is the compatibility between the printing apparatus of the next priority and the printing apparatus of the previous priority. Therefore, when an error occurs during the printing process to the selected printing apparatus, if the printing apparatus which is selected as a printing apparatus of the next priority has the compatibility with the printing apparatus of the previous priority, the print control information which has already been converted can be directly transferred and the re-converting process is unnecessary. The print processing time in the printing apparatus of the next priority can be remarkably reduced.

[0117] A construction of a data processing program which can be read out by a print system to which the data processing apparatus according to the invention can be applied will now be described hereinbelow with reference to a memory map shown in **FIG. 12**.

[0118] **FIG. 12** is a diagram for explaining the memory map of the memory medium to store various data processing programs which can be read out by the print system to which the data processing apparatus according to the invention can be applied.

[0119] Although not particularly shown, information to manage the programs which are recorded into the memory medium, for example, version information, persons who made the programs, and the like are also stored. There is also a case where information depending on the OS or the like on the program reading side, for example, icons or the like to display the programs so that they can be identified are stored.

[0120] Further, the data depending on various programs is also managed in a directory. There is also a case where a program to install various programs into a computer or, if the program to install has been compressed, a program to decompress the compressed program, and the like are stored.

[0121] The functions shown in **FIGS. 9 and 11** in the embodiment can be also executed by the host computer in accordance with a program that is installed from the outside. In this case, the invention can be also applied even in the case where a group of information including the program is supplied to the output apparatus by a memory medium such as CD-ROM, flash memory, FD, or the like or from an external memory medium through a network.

[0122] It will be obviously understood that the object of the invention is accomplished by a method whereby a memory medium in which program codes of software to realize the functions of the foregoing embodiments have been recorded as mentioned above is supplied to a system or an apparatus and a computer (or a CPU or an MPU) of the system or apparatus reads out and executes the program codes stored in the memory medium.

[0123] In this case, the program codes themselves read out from the memory medium realize a novel function of the present invention and a memory medium in which the program codes have been recorded constructs the invention.

[0124] As a memory medium to supply the program codes, for example, it is possible to use any one of, for example, a floppy disk, a hard disk, an optical disk, a magnetooptic disk, a CD-ROM, a CD-R, a magnetic tape, a non-volatile memory card, an ROM, an EEPROM, or the like.

[0125] It will be also obviously understood that not only a case where the functions of the foregoing embodiments are realized by executing the read-out program codes by the computer but also a case where the OS (operating system) or the like which is operating on the computer executes a part or all of the actual processes in response to instructions of the program codes and the functions of the embodiments mentioned above are realized by those functions.

[0126] Further, it will be obviously understood that the invention also incorporates a case where the program codes read out from the memory medium are written into a memory provided for a function expanding board inserted into a computer or a function expanding unit connected to the computer and, after that, a CPU or the like provided for the function expanding board or the function expanding unit executes a part or all of the actual processes on the basis of instructions of the program codes, and the functions of the foregoing embodiments are realized by those processes.

[0127] [Third Embodiment]

[0128] The third embodiment of the invention will now be described hereinbelow with reference to the drawings. It is an object of the third embodiment to provide print control apparatus and method for realizing that a fault during the print execution is avoided and the print is certainly executed without troubling the user. Another object of the invention is to enable a print output desired by the user to be performed by notifying the user of a problem that is caused due to the change of the printing apparatus on the output destination or by solving the problem by the alternate means.

[0129] The print control apparatus comprises: print control means for forming data which does not depend on a printing apparatus to execute the print; means for converting the data which was formed by the print control means and does not depend on the printing apparatus into print data to an arbitrary printing apparatus; means for transmitting the print data to the printing apparatus; means for monitoring until the completion of the print of the transmitted print data; means for changing a printing apparatus on the output destination side on the basis of the data which does not depend on the printing apparatus in the case where the print is unsuccessfully completed due to some causes, for converting into the print data to the changed printing apparatus, and for executing the print.

[0130] The diagrams of FIGS. **1** to **4** mentioned above are also commonly used. The invention can be applied to any one of sole equipment, a system comprising a plurality of equipment, and a system which is connected through a network such as LAN, WAN, or the like and in which processes are executed so long as the functions of the invention are executed.

[0131] In **FIG. 1**, reference numeral **18** denotes the foregoing operation panel on which switches for the operation, an LED display, and the like are arranged.

[0132] As a foregoing external memory **14**, the number of external memories is not limited to one but a plurality of external memories can be provided. That is, it is possible to construct such that in addition to built-in fonts, option cards and a plurality of external memories in which programs to interpret printer control languages of different language systems have been stored can be connected. Further, the apparatus can also have an NVRAM (not shown) and store printer mode set information from the operation panel **1501**. A subsequent description up to **FIG. 4** is omitted hereinbelow because it is overlapped to that mentioned above.

[0133] **FIG. 2** is the constructional block diagram of a typical printing process in the host computer to which the printing apparatuses such as printers or the like are directly connected or are connected via the network. The application **201**, graphic engine **202**, printer driver **203**, and system spooler **204** exist as files saved in the external memory **11** and are program modules which are loaded into the RAM **2** and are executed by the OS or a module using the program module when they are executed. The application **201** and printer driver **203** can be added to an FD of the external memory **11** or a CD-ROM (not shown) or into an HD as an external memory **11** via a network (not shown). The application **201** saved in the external memory **11** is loaded into the RAM **2** and is executed. However, when the print is performed from the application **201** to the printer **1500**, print data is outputted (drawn) by using the graphic engine **202** which has similarly been loaded in the RAM **2** and can be executed. The graphic engine **202** similarly loads the printer driver **203** prepared every printing apparatus from the external memory **11** into the RAM **2** and converts the output of the application **201** into a control command of the printer by using the printer driver **203**. The converted printer control command is outputted to the printer **1500** via the interface **21** through the system spooler **204** loaded in the RAM **2** by the OS.

[0134] Although the embodiment is made with respect to the print system comprising the printer and the host computer shown in **FIG. 2** as a prerequisite, it is made further with regard to a system such that the print data from the application is once spooled by the intermediate code data as shown in **FIG. 3** as a prerequisite. **FIG. 3** shows a construction which is obtained by expanding the system of **FIG. 2** and in which the spool file **303** comprising the intermediate codes is once formed when a print command is transmitted from the graphic engine **202** to the printer driver **203**. In the print system shown in **FIG. 2**, the application **201** is released from the printing process at a time point when the printer driver **203** completes the conversion of all of print commands from the graphic engine **202** into the control commands of the printer. In the system shown in **FIG. 3**, however, the application is released at a time point when the spooler **302** converts all print commands into intermediate code data and outputs them to the spool file **303**. Usually, the processing time in the latter system is shorter than that in the former system.

[0135] **FIG. 3** will now be described in detail hereinbelow. As shown in the diagram, according to the expanded processing system, the common printer driver **301** receives the print command from the graphic engine **202**. When the print command received by the common printer driver **301** from the graphic engine **202** is a print command issued from the application **201** to the graphic engine **202**, the common printer driver **301** loads the spooler **302** stored in the external memory **11** into the RAM **2** and sends the print command to the spooler **302** instead of the printer driver **203**. The spooler **302** converts the received print command into an intermediate code and outputs it to the spool file **303**. The spooler **302** obtains modification set contents regarding the print data set for the printer driver **203** from the printer driver **203** and saves into the spool file **303**. Although the spool file **303** is formed as a file on the external memory **11**, it can be also formed on the RAM **2**. Further, the spooler **302** loads the spool file manager **304** stored in the external memory **11** into the RAM **2** and notifies the spool file manager **304** of a forming situation of the spool file **303**. After that, when it is determined that the print can be performed by again using the graphic engine **202**, the spool file manager **304** loads the despooler **305** stored in the external memory **11** into the RAM **2** and instructs the despooler **305** to perform the printing process of the intermediate code described in the spool file **303**. The despooler **305** again outputs the intermediate code included in the spool file **303** to the printer driver **203** via the graphic engine **202**. The printer driver **203** forms a printer control command and outputs it to the printer **1500** via the system spooler **204**.

[0136] **FIG. 4** is a diagram showing the memory map in a state where the print program in the embodiment has been loaded into the RAM **2** on the host computer **3000** and can be executed. The print control program in the embodiment exists as a part of the print associated program **404**.

[0137] The third embodiment will now be described hereinbelow with reference to FIGS. **13** to **19**. **FIG. 13** is a flowchart showing the contents of the processes in the third embodiment.

[0138] **FIG. 14** shows an example of a system construction in the embodiment. A state where printer drivers A, B, and C corresponding to the printers which are local-connected, directly connected, and connected via the server in the client **600** to form the print data in the diagram is simply illustrated.

[0139] **FIG. 15** shows an example of a construction to monitor whether the print has successfully been completed or not.

[0140] **FIG. 16** shows an example of a display of an error message when the print is unsuccessfully completed. **FIG. 17** shows an example of information showing the print priorities. **FIG. 18** shows an example of a display of a message that is displayed when there is a print designation which will be made ineffective in case of executing the print to the printer of the next priority. The embodiment will now be described in detail hereinbelow mainly with reference to the flowchart shown in **FIG. 13**.

[0141] First, as shown in **FIG. 13**, the processing routine in the embodiment is loaded into the RAM **2** under the management of the OS **405** as shown in **FIG. 4** and is started when the user designates the printer on the print destination side and instructs the print execution by the application **201** under execution by using the keyboard controller KBC **5** or the like shown in **FIG. 1**. For example, in the case where the data can be outputted to the three printers A, B, and C from the application which operates on the client **600** as shown in **FIG. 14** by using the printer drivers A, B, and C, the user selects any one of the printer drivers A, B, and C and

executes the print. In the following description using the flowchart of the embodiment, it is assumed that the printer driver selected by the user at this time is the printer driver A **203**. When the print is instructed by the user, the application **201** instructs the graphic engine **202** to execute the print command until all of the print data is extinguished (step **501**). The graphic engine **202** which received the print command from the application **201** accesses the common printer driver **301** onto the RAM **2** in place of the printer driver A **203** designated by the user and executes the print. The common printer driver **301** accesses the spooler **302**, converts the received print command into the intermediate code of the print command, and saves it into the spool file **303** (step **502**). As mentioned above, when the common printer driver **301** converts all of the print commands from the graphic engine **202** into the intermediate codes, saves them into the spool file, and finishes the processes, the application **201** is released (step **503**). Subsequently, as already described in **FIG. 3**, the printer driver A **203** corresponding to the printer A **604** in which the print has been designated by the user via the spool file manager **304**, despooler **305**, and graphic engine **202** is set to an output destination and the print is executed (step **504**). The spool file manager **304** discriminates whether the print in step **504** has successfully been completed or not. The actual confirmation is performed by monitoring a processing situation of each module (whether it has successfully been completed or unsuccessfully completed) in a flow of the printing process. In the embodiment, as shown in **FIG. 15**, the successful completion is discriminated by monitoring the states of the graphic engine **202**, system spooler **204**, and printers A, B, and C. As examples of the unsuccessful completion, a shortage of a memory capacity in the graphic engine **202**, a shortage of the disk, a transmission error of the data to the printer in the system spooler **204**, a paper jam in the printer, and the like can be mentioned (step **505**). When it is now decided that the print has successfully been completed or when there is no need to discriminate whether the print has successfully been completed or not, the spool file manager **304** deletes the spool file **303** and all of the processes are finished (step **512**). As an example in the case where there is no need to discriminate whether the print has successfully been completed or not, as will be explained hereinlater, there is a case where since an error occurred in the printer in which it has initially been tried to print, although it is intended to print by the printer of the next priority, a part of the print output is not compatible, so that the data is again outputted to the original printer. On the other hand, when the print is not successfully completed, a check is made to see if there is a printer driver of a next priority among the printer drivers which can be used in the host computer **3000** (step **506**). As a deciding method of the printer driver of the next priority, the user previously stores a table in which the priorities have been defined into the RAM **2** or external memory **11** and sequentially traces the priority defined table, so that it can be decided. As another method of deciding the printer driver of the next priority, it is also possible to use a method whereby the information which the printer drivers have is collected from each printer driver and stored into the external memory **11**, a table showing the priorities of the printer drivers similar to the table of **FIG. 17** is formed on the basis of those information in accordance with the compatibility with the printer driver designated as a print destination side upon print execution, location information of the printer (where the printer is installed), and the like, thereby deciding. When the printer driver of the next priority does not exist, a message shown in **FIG. 16** is displayed on the CRT **10** (step **511**) in order to notify the user of a result of the unsuccessful completion of the print. Subsequently, the spool file **303** is deleted and the processes are finished (step **512**). On the other hand, if there is the printer driver of the next priority, such a driver is selected as a driver of the next priority (step **507**). In case of the embodiment, since the next candidate is the printer B as shown in FIG. **17**, the printer driver B is selected as a next candidate. Subsequently, an evaluation about whether a difference between the prints does not occur or not when the print is executed by the printer driver B which is subsequently selected and by the printer driver A which was inherently selected is performed by obtaining information from the common printer driver to each printer driver via a predetermined interface for inquiry. Although there are various checking items about the difference between the prints, for instance, items such as permission/inhibition of a double-sided printing mode, output paper size, permission/inhibition of staple, sort, binding print, and the like can be mentioned (step **508**). When there is no difference between the prints, the despooler **305** instructs the graphic engine **202** to re-execute the print of the contents in the spool file **303** (step **504**). The printing process is performed while the printer drivers are switched until the print is successfully completed or until the printer driver of the next priority does not exist as mentioned above. When it is determined that the difference between the prints occurs, a message as shown in **FIG. 18** is displayed to the CRT **10** in order to notify the user of such a fact. The user is allowed to confirm whether the print is continued by the printer driver of the next priority or not. **FIG. 18** shows a state where the double-sided printing mode is impossible in case of executing the print by using the printer driver B of the next priority (step **509**). When the continuation of the print is selected, the despooler **305** instructs the graphic engine **202** to re-execute the print of the contents of the spool file **303** (step **504**). When the stop of the print is selected, on the other hand, the selection of the printer driver of the next priority is changed so as to again print by the initially selected printer driver without printing by the printer driver of the next priority (step **510**). Subsequently, the despooler **305** instructs the graphic engine **202** to re-execute the print of the contents of the spool file **303** (step **504**). In this case, however, after the print error once occurred, since the print is retried to the same printer, the discrimination about the end of the print is not performed, the spool file **303** is deleted, and the processes are finished (step **512**).

[**0142**] All of the printing processes from the application are finished by the above processing routine, the processes of the printing program in the embodiment are also finished, and the data is deleted from the RAM **2** by the function of the OS **405**. In the embodiment, although the external memory is used as a medium to record the printing program, any one of an FD drive, an HD drive, a CD-ROM, an IC memory card, and the like can be also used as an external memory. Further, it is also possible to construct such that the printing program is recorded solely in the ROM **3** or is recorded therein together with programs which operate on the OS or the other host computer and is constructed so as to form a part of the memory map and is directly executed by the CPU **1**.

[0143] [Further Another Embodiment]

[0144] In the above embodiments, when there is a function which cannot be executed by the driver of the next priority in response to the print instruction of the user in step **508**, the user is allowed to confirm whether the print is continued or not in step **509**. In the embodiment, however, as a process between steps **508** and **509**, a process to change the operating mode of the printer driver to a mode for substituting the functions which can be substituted by the processes on the printer driver side among the functions which cannot be processed due to the printer function is added. This process will now be described hereinbelow with reference to **FIG. 19**.

[0145] First in step **508**, when it is determined that there is the print instruction of the user showing that it cannot be executed by the driver of the next priority, a check is made to see if the print instruction instructed by the user cannot be executed by the driver of the next priority due to the printer, and further, whether the limitation due to the printer can be substituted by the processes on the host side or not is also performed (step **1101**). It is effective to perform the above two discriminating processes by, for example, obtaining the information by a predetermined interface for inquiry. A table, a database, or the like in which the abilities of the printer drivers are gathered can be also obviously used. If it cannot be substituted, the processing routine is returned to the process in step **509** as it is. When it can be substituted, subsequently, to realize the relevant function by the function on the printer driver side instead of the printer function, the operating mode of the printer driver is changed (step **1102**). In this case, the process in step **509** is skipped and the processing routine directly advances to the process in step **504**. For instance, as printer functions which can be substituted by the printer driver, there are a regular size enlargement or reduction of the paper size, a zoom, a page layout print (N pages, poster, or the like), a print of a copy unit basis, a binding print, and the like. As printer functions which cannot be substituted by the printer driver, functions which can be realized by only devices such as designation of a paper feed port, designation of a paper ejection port, staple, double-sided printing mode, and the like can be mentioned. As for the subsequent processes, in a manner similar to those in the foregoing embodiments, the despooler **305** instructs the graphic engine **202** to re-execute the print of the contents of the spool file **303** (step **504**). When the print is successfully completed, the spool file **303** is deleted and the processing routine is finished (step **512**).

[0146] All of the printing processes from the application are finished by the above processing routine, the processes of the printing program in the embodiment are also finished, and the data is deleted from the RAM **2** by the function of the OS **405**. In the embodiment, although the external memory is used as a medium to record the printing program, any one of an FD drive, an HD drive, a CD-ROM, an IC memory card, and the like can be also used as an external memory. Further, it is also possible to construct such that the printing program is recorded solely in the ROM **3** or is recorded therein together with programs which operate on the OS or the other host computer and is constructed so as to form a part of the memory map and is directly executed by the CPU **1**.

[0147] [Effects of the Invention]

[0148] As described above, according to the first aspect of the invention, there is provided a print control apparatus which can communicate with a plurality of printing apparatuses via a predetermined communication medium, comprising: first converting means for converting drawing information which is required from an application into a drawing object which does not depend on each printing apparatus; storing means for storing the drawing object converted by the first converting means; a plurality of second converting means for converting the drawing object stored in the storing means into print control information that is peculiar to the printing apparatus that is selected and for transferring the print control information to each corresponding printing apparatus; discriminating means for discriminating the occurrence of a print processing error by monitoring a print processing state for a time interval from the start of the converting process by any one of the second converting means until a printing process of any one of the printing apparatuses is finished; and control means for selecting any one of the second converting means corresponding to the set other printing apparatus when it is determined by the discriminating means that the print processing error has occurred in such one of the printing apparatuses. Therefore, the drawing object which does not depend on each printing apparatus is held until the printing process is successfully completed in the selected one of the printing apparatuses. When some error occurs during the printing process for the printing apparatus selected by the user, the set next alternate printing apparatus is selected. The peculiar print control information is converted from the stored drawing object and can be sequentially transferred to the selected printing apparatus. The selection burden of the candidates of the printing apparatuses of the user can be reduced. The print control information can be soon transferred to the printing apparatus of the next priority. The print environment such that the print processing time can be remarkably reduced and the printing process can be efficiently performed can be established.

[0149] According to the second aspect of the invention, in the print control apparatus, the print processing error includes a conversion processing error by any one of the second converting means, a transfer error of the print control information which is converted by any one of the second converting means, and an engine operation error of any selected one of the printing apparatuses. Therefore, the print processing error during a series of printing process is captured and the printing process can be dynamically switched from the selected printing apparatus to the printing process for the set other printing apparatus.

[0150] According to the third aspect of the invention, the print control apparatus further has: setting means for setting, every printing apparatus, the printing apparatus of a next priority to which the drawing object stored in the storing means should be transferred when the print processing error occurs; and memory means for storing a list of the printing apparatuses of a next priority which have been set by the setting means and to which the drawing object should be transferred, wherein the control means selects any one of the second converting means corresponding to another printing apparatus set in the list of the printing apparatuses of the next priority stored in the memory means. Therefore, the print control information which is converted from the draw-

ing object stored for the desired printing apparatus can be sequentially transferred in accordance with the priorities which are desired by the user.

[0151] According to the fourth aspect of the invention, since the printing apparatus includes a local printer and network printers, the alternate printing apparatus candidates at the time of the occurrence of a fault can be freely selected from various print environments.

[0152] According to the fifth aspect of the invention, in the print control apparatus, the network printers include: a first network printer which is connected to the predetermined communication medium via a server; and a second network printer which is directly connected to the predetermined communication medium. Therefore, the alternate network printer candidates at the time of the occurrence of a fault can be freely selected from various network printer environments.

[0153] According to the sixth or eleventh aspect of the invention, there is provided a data processing method of a print control apparatus which can communicate with a plurality of printing apparatuses via a predetermined communication medium or there is also provided a memory medium in which a computer readable program for controlling a data processing apparatus which can communicate with a plurality of printing apparatuses via a predetermined communication medium has been stored. The above data processing method or the above computer readable program stored in the memory medium comprises: a first converting step of converting drawing information which is required from an application into a drawing object which does not depend on each printing apparatus; a storing step of storing the drawing object converted by the first converting step into a memory; a plurality of second converting steps of converting the drawing object stored in the memory by the storing step into print control information that is peculiar to the printing apparatus that is selected and transferring the print control information to each corresponding printing apparatus; a discriminating step of discriminating the occurrence of a print processing error by monitoring a print processing state for a time interval from the start of the converting process by any one of the second converting steps until a printing process of any one of the printing apparatuses is finished; and a selecting step of selecting any one of the second converting steps corresponding to the set other printing apparatus when it is determined by the discriminating step that the print processing error has occurred in such one of the printing apparatuses. Therefore, the drawing object which does not depend on each printing apparatus is held until the printing process is successfully completed in the selected one of the printing apparatuses, and when some error occurs during the printing process to the printing apparatus selected by the user, the set next alternate printing apparatus is selected, and the peculiar print control information is converted from the stored drawing object and can be sequentially transferred to the selected printing apparatus. The selection burden of the printing apparatus candidates of the user can be reduced. The print control information can be soon transferred to the printing apparatus of the next priority. The print environment in which the print processing time is remarkably reduced and the printing process can be efficiently performed can be established.

[0154] According to the seventh or twelfth aspect of the invention, in the data processing method or the computer readable program stored in the memory medium, the print processing error includes a conversion processing error by any one of the second converting steps, a transfer error of the print control information which is converted by any one of the second converting steps, and an engine operation error of any selected one of the printing apparatuses. Therefore, the print processing error during the series of printing processes is captured and the printing process can be dynamically switched from the selected printing apparatus to the set other printing apparatus.

[0155] According to the eighth or thirteenth aspect of the invention, the data processing method or the computer readable program stored in the memory medium further has: a setting step of setting, every printing apparatus, the printing apparatus of a next priority to which the drawing object stored in the memory should be transferred when the print processing error occurs; and a registering step of registering a list of the printing apparatuses of a next priority which have been set by the setting step and to which the drawing object should be transferred into the memory, wherein in the selecting step, any one of the second converting steps corresponding to another printing apparatus set in the list of the printing apparatuses of the next priority stored in the memory is selected. Therefore, the print control information which is converted from the drawing object stored can be sequentially transferred to the desired printing apparatus in accordance with the priority which is desired by the user.

[0156] According to the ninth or fourteenth aspect of the invention, since the printing apparatus includes a local printer and network printers, the alternate printing apparatus candidate at the time of the occurrence of a fault can be freely selected from various print environments.

[0157] According to the tenth or fifteenth aspect of the invention, in the data processing method or the computer readable program stored in the memory medium, the network printers include: a first network printer which is connected to the predetermined communication medium via a server; and a second network printer which is directly connected to the predetermined communication medium. Therefore, the alternate network printer candidate at the time of the occurrence of a fault can be freely selected from various network printer environments.

[0158] According to the sixteenth aspect of the invention, the print control apparatus further has second discriminating means for discriminating a compatibility between the printing apparatus of the next priority selected by the selecting means and a printing apparatus of a previous priority, wherein the control means transfers the converted print control information to the printing apparatus of the next priority when it is determined by the second discriminating means that there is the compatibility between the printing apparatus of the next priority and the printing apparatus of a previous priority. Therefore, when an error occurs during the printing process to the selected printing apparatus, if the printing apparatus which is selected as a printing apparatus of the next priority has the compatibility with the printing apparatus of the previous priority, the print control information which has already been converted can be directly transferred and the re-converting process is unnecessary. The print processing time in the printing apparatus of the next priority can be remarkably reduced.

[0159] According to the seventeenth or eighteenth aspect of the invention, the data processing method or the computer readable program stored in the memory medium has: a second discriminating step of discriminating a compatibility between the printing apparatus of the next priority selected by the selecting step and a printing apparatus of a previous priority; and a transferring step of transferring the converted print control information to the printing apparatus of the next priority when it is determined by the second discriminating step that there is the compatibility between the printing apparatus of the next priority and the printing apparatus of the previous priority. Therefore, when an error occurs during the printing process to the selected printing apparatus, if the printing apparatus which is selected as a printing apparatus of the next priority has the compatibility with the printing apparatus of the previous priority, the print control information which has already been converted can be directly transferred and the re-converting process is unnecessary. The print processing time in the printing apparatus of the next priority can be remarkably reduced.

[0160] Therefore, there is an effect such that the print processing environment in which the alternate printing process can be automatically performed by the printing apparatus of the next priority when a fault occurs during the printing process can be freely established, or the like.

[0161] According to the invention as described above, it is possible to provide a print control apparatus and its method, in which the application can be soon released and, further, the processes such that a fault during the execution of the print is avoided and the print can be certainly performed without troubling the user are realized.

[0162] Further, in a state where the application is released, the problem occurring due to the change of the printing apparatus on the output destination side can be notified to the user and is solved by the alternate means, thereby enabling a desired print output of the user to be executed.

What is claimed is:

1. A print control apparatus which can communicate with a plurality of printing apparatuses via a predetermined communication medium, comprising:

first converting means for converting drawing information which is required from an application into independent data which does not depend on each of said printing apparatuses;

a plurality of second converting means for converting said independent data into print control information that is peculiar to the printing apparatus that is selected and for transferring the print control information to each corresponding printing apparatus;

discriminating means for discriminating an occurrence of a print processing error by monitoring a print processing state of any one of the printing apparatuses for a time interval from a start of the converting process by any one of said second converting means; and

control means for selecting any one of said second converting means corresponding to the set other printing apparatus when it is determined by said discriminating means that said print processing error has occurred in said one of the printing apparatuses.

2. An apparatus according to claim 1, wherein said print processing error includes a conversion processing error by said any one of the second converting means, a transfer error of said print control information which is converted by said any one of the second converting means, and an engine operation error of any selected one of the printing apparatuses.

3. An apparatus according to claim 1, further comprising:

storing means for storing said independent data converted by said first converting means;

setting means for setting, every printing apparatus, the printing apparatus of a next priority to which said independent data stored in said storing means should be transferred when said print processing error occurs; and

memory means for storing a list of the printing apparatuses of a next priority which have been set by said setting means and to which said independent data should be transferred,

and wherein said control means selects any one of said second converting means corresponding to another printing apparatus set in the list of the printing apparatuses of the next priority stored in said memory means.

4. An apparatus according to claim 1, wherein said printing apparatus includes a local printer and network printers.

5. An apparatus according to claim 4, wherein said network printers include:

a first network printer which is connected to said predetermined communication medium via a server; and

a second network printer which is directly connected to said predetermined communication medium.

6. A data processing method of a print control apparatus which can communicate with a plurality of printing apparatuses via a predetermined communication, medium, comprising:

a first converting step of converting drawing information which is required from an application into independent data which does not depend on each of said printing apparatuses;

a plurality of second converting steps of converting said independent data converted by said first converting step into print control information that is peculiar to the printing apparatus that is selected and transferring said print control information to each corresponding printing apparatus;

a discriminating step of discriminating an occurrence of a print processing error by monitoring a print processing state of any one of said printing apparatuses for a time interval from a start of the converting process by any one of said second converting steps; and

a selecting step of selecting any one of the second converting steps corresponding to the set other printing apparatus when it is determined by said discriminating step that said print processing error has occurred in said any one of the printing apparatuses.

7. A method according to claim 6, wherein said print processing error includes a conversion processing error by said any one of the second converting steps, a transfer error

of said print control information which is converted by said any one of the second converting steps, and an engine operation error of any selected one of the printing apparatuses.

8. A method according to claim 6, further comprising:

a storing step of storing said independent data converted by said first converting step into a memory;

a setting step of setting, every printing apparatus, the printing apparatus of a next priority to which said independent data stored in said memory should be transferred when said print processing error occurs; and

a registering step of registering a list of the printing apparatuses of a next priority which have been set by said setting step and to which said independent data should be transferred into said memory,

and wherein in said selecting step, any one of the second converting steps corresponding to another printing apparatus set in the list of the printing apparatuses of the next priority stored in said memory is selected.

9. A method according to claim 6, wherein said printing apparatus includes a local printer and network printers.

10. A method according to claim 9, wherein said network printers include:

a first network printer which is connected to said predetermined communication medium via a server; and

a second network printer which is directly connected to said predetermined communication medium.

11. A memory medium in which a computer readable program for controlling a data processing apparatus which can communicate with a plurality of printing apparatuses via a predetermined communication medium has been stored, wherein said program comprises:

a first converting step of converting drawing information which is required from an application into independent data which does not depend on each of said printing apparatuses;

a plurality of second converting steps of converting said independent data converted by said first converting step into print control information that is peculiar to the printing apparatus that is selected and transferring said print control information to each corresponding printing apparatus;

a discriminating step of discriminating an occurrence of a print processing error by monitoring a print processing state for a time interval from a start of the converting process by any one of said second converting steps; and

a selecting step of selecting any one of the second converting steps corresponding to the set other printing apparatus when it is determined by said discriminating step that said print processing error has occurred in said one of the printing apparatuses.

12. A medium according to claim 11, wherein said print processing error includes a conversion processing error by said any one of the second converting steps, a transfer error of said print control information which is converted by said any one of the second converting steps, and an engine operation error of any selected one of the printing apparatuses.

13. A medium according to claim 11, wherein said program further comprises:

a storing step of storing said independent data converted by said first converting step into a memory;

a setting step of setting, every printing apparatus, the printing apparatus of a next priority to which said independent data stored in said memory should be transferred when said print processing error occurs; and

a registering step of registering a list of the printing apparatuses of a next priority which have been set by said setting step and to which said independent data should be transferred into said memory,

and in said selecting step, any one of the second converting steps corresponding to another printing apparatus set in the list of the printing apparatuses of the next priority stored in said memory is selected.

14. A medium according to claim 11, wherein said printing apparatus includes a local printer and network printers.

15. A medium according to claim 14, wherein said network printers include:

a first network printer which is connected to said predetermined communication medium via a server; and

a second network printer which is directly connected to said predetermined communication medium.

16. An apparatus according to claim 1, further comprising second discriminating means for discriminating a compatibility between the printing apparatus of the next priority selected by said selecting means and a printing apparatus of a previous priority,

and wherein said control means transfers the converted print control information to the printing apparatus of the next priority when it is determined by said second discriminating means that there is the compatibility between the printing apparatus of the next priority and the printing apparatus of the previous priority.

17. A method according to claim 6, further comprising:

a second discriminating step of discriminating a compatibility between the printing apparatus of the next priority selected by said selecting step and a printing apparatus of a previous priority; and

a transferring step of transferring the converted print control information to the printing apparatus of the next priority when it is determined by said second discriminating step that there is the compatibility between the printing apparatus of the next priority and the printing apparatus of the previous priority.

18. A medium according to claim 11, wherein said program further comprises:

a second discriminating step of discriminating a compatibility between the printing apparatus of the next priority selected by said selecting step and a printing apparatus of a previous priority; and

a transferring step of transferring the converted print control information to the printing apparatus of the next priority when it is determined by said second discriminating step that there is the compatibility between the printing apparatus of the next priority and the printing apparatus of the previous priority.

19. An apparatus according to claim 1, further comprising:

means for, when the print in said printing apparatus is unsuccessfully completed and when the print cannot be performed even in the printing apparatus on an output destination side after the change, notifying the user of such a fact; and

means for allowing the user to select whether the subsequent print is continued or not and, when the user selects the stop of the print, allowing the printing apparatus before the change to re-execute the print.

20. An apparatus according to claim 19, further comprising means for modifying print data which is sent to the printing apparatus on the basis of the data that does not depend on the printing apparatus and substituting a print instruction of the user in the case where the print instruction of the user cannot be executed because of a shortage of an ability of the printing apparatus after the change.

21. A method according to claim 6, further comprising the steps of:

when the print in said printing apparatus is unsuccessfully completed and when the print cannot be executed even in the printing apparatus on an output destination side after the change, notifying the user of such a fact; and

allowing the user to select whether the subsequent print is continued or not and, when the user selects the stop of the print, allowing the printing apparatus before the print to re-execute the print.

22. A method according to claim 21, further comprising the step of modifying print data which is sent to the printing apparatus on the basis of the data that does not depend on the printing apparatus and substituting a print instruction of the user in the case where the print instruction of the user cannot be executed because of a shortage of an ability of the printing apparatus after the change.

23. A computer readable memory medium to store a computer program which enables an arbitrary printing apparatus to execute a print, wherein said program comprises the steps of:

converting data which is formed by print control means and does not depend on a printing apparatus into print data to said arbitrary printing apparatus;

transmitting said print data to the printing apparatus;

monitoring a state until a completion of the print of said transmitted print data;

when said print is unsuccessfully completed, changing a printing apparatus on an output destination side on the basis of said data which does not depend on the printing apparatus, converting the print data into the print data to the printing apparatus after the change, and executing the print;

when a print instruction of the user before said change cannot be executed as it is by the printing apparatus on the output destination side after the change, notifying the user of such a fact; and

allowing the user to select whether the subsequent print is continued or not and, when the user selects the stop of the print, allowing the printing apparatus before the change to re-execute the print.

24. A medium according to claim 23, wherein said program further comprises the step of, when the print instruction of the user cannot be executed because of a shortage of an ability of the printing apparatus after the change, modifying the print data that is sent to the printing apparatus on the basis of said data which does not depend on the printing apparatus and substituting the print instruction of the user.

25. An apparatus according to claim 1, wherein said independent data is a drawing object.

26. A method according to claim 6, wherein said independent data is a drawing object.

27. A medium according to claim 11, wherein said independent data is a drawing object.

28. A medium according to claim 23, wherein said independent data is a drawing object.

* * * * *